FEMI 209 390673

FLOOD INSURANCE STUDY

VILLAGE OF DUBLIN, OHIO

FRANKLIN, DELAWARE AND UNION COUNTIES

REVISED:

OCTOBER 17, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 390673

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

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FLOOD INSURANCE STUDY REVISION

VILLAGE OF DUBLIN,
FRANKLIN, DELAWARE, AND UNION COUNTIES,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study Revision investigates the existence and severity of flood hazards in the Village of Dublin, Franklin, Delaware, and Union Counties, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgements

The sources of authority for this Flood Insurance Study Revision are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey (USGS), Water Resources Division (the Study Contractor) for the Federal Emergency Management Agency (FEMA) (formerly the Federal Insurance Administration), under Inter-Agency Agreement No. IAA-H-8-76, Project Order No. 12. This study was originally completed in May 1978 and revised in September 1985 using the data from the Flood Insurance Study for Franklin County, Unincorporated Areas, Ohio (Reference 1).

1.3 Coordination

Coordination of this study included notification to the Village of Dublin of the initiation of study by letter and a legal notice placed in a local newspaper for three consecutive weeks. An initial meeting was held October 30, 1975, with the Mayor and Village Engineer, at which time information was gathered on the identification of flood problems, location of high water marks, and availability of reports and maps. A second meeting was held November 13, 1975, attended by representatives of the Ohio Department of Natural Resources (DNR), the Village of Dublin, FEMA,

and the Study Contractor, at which time it was decided which streams were to be studied in detail or by approximate methods. From time to time during the study, flood information was collected from local residents. Basic hydrologic data were submitted to the Village of Dublin, the Ohio DNR, and the U.S. Army Corps of Engineers (COE), Huntington District, for review and comment. This report was presented to local officials and interested citizens at a public meeting.

On April 25, 1979, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study Revision covers the incorporated area of the Village of Dublin, Franklin, Delaware, and Union Counties, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

Detailed analyses were performed on the following streams:

a. The Scioto River, from Hayden Run Road to approximately 500 feet upstream of the confluence of Deer Run;

b. Indian Run, from its confluence with the Scioto River to the confluence of North Fork Indian Run;

c. North Fork Indian Run, from its confluence with Indian Run to the county boundary, approximately 3,500 feet upstream of Brand Road;

d. South Fork Indian Run, from its confluence with Indian Run to a point approximately 1,500 feet upstream of Avery Road;

e. Tributary S1, from its mouth to a point approximately 900 feet upstream of Interstate 270; and,

f. Tributary S2, from its mouth to just upstream of Macbeth Drive.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

Approximate methods were used on the following watercourses:

a. South Fork Indian Run, from about 1,500 feet upstream of Avery Road to the Franklin-Union county boundary;

b. Tributary S2, from just upstream of Macbeth Drive to Sawmill Road;

c. Deer Run, within the corporate limits;

d. Tri-County Ditch, from the mouth to the Franklin-Union county boundary;

e. Cramer Ditch, within the corporate limits;

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

f. Tributary S3, from the mouth to a point approximately 2,000 feet upstream of State Route 257;

g. Tributary S4, within the corporate limits;

h. Tributary I1, from its mouth to a point approximately 5,000 feet upstream;

i. Tributary I2, from its mouth to the Franklin-Union county boundary;

j. Tributary C1, within the corporate limits; and,

k. Tributary D1, from its mouth to a point approximately 1,300 feet upstream of Muirfield Drive.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction. The scope and methods of study were proposed to and agreed upon by FEMA and the Village of Dublin.

2.2 Community Description

The Village of Dublin is a developing community with a 1980 census population of 3,855 (Reference 2). The village is located near the capital City of Columbus in central Ohio. Dublin is located in the northwestern part of Franklin County, the southwestern part of Delaware County, and extends its western boundary into Union County. Dublin is surrounded by unincorporated areas of Union County on the west, the Village of Shawnee Hills and unincorporated areas of Delaware County on the north, the City of Columbus and unincorporated areas of Franklin County on the east, and unincorporated areas of Franklin County on the south.

Factors that affect flooding include soils that are mainly glacial till, composed of well-drained, poorly sorted, and bedded silt and sand underlain by limestone (Reference 3). Vegetation is mostly grasses, corn, and grains. The terrain is steep along the banks of the Scioto River, which runs north and south through the corporate limits, but becomes relatively flat away from the river banks.

The climate is continental, with temperatures ranging from an average daily minimum of 41.6 degrees Fahrenheit (F.) to an average daily maximum of 62.3 degrees F. The average annual precipitation of the study area is 35 inches and is fairly uniformly distributed throughout the year (Reference 4).

The community is presently about 70 percent rural and 30 percent residential and commercial. Residential development is primarily centered around the major roads in Dublin and in the southeastern portion of the village. Commercial development is located around Interstate Highway 270. Muirfield Village Golf Course and complex, developed by the well-known golfer Jack Nicklaus, is located within the northern corporate limits. Most of the flood plains in Dublin are undeveloped farmland.

2.3 Principal Flood Problems

The history of flooding on streams within the Village of Dublin indicates that major floods on the main stream of the Scioto River occur as a result of snowmelt and spring rains, while floods on the smaller tributaries are usually the result of summer thunderstorm activity. The banks of the Scioto River are high enough that the passage of large flood discharges does not cause excessive, widespread damage except in low-lying areas along the stream. Two major floods (References 5 and 6) occurred in March 1913 and January 1959. At the gaging station on the Scioto River below O'Shaughnessy Dam (gage No. 03221000), located 3 miles north of Dublin, the 1913 flood reached an estimated elevation of 799.6 feet National Geodetic Vertical Datum of 1929 (NGVD) with a discharge of 74,500 cubic feet per second (cfs) and an estimated recurrence interval of 500 years. The elevation of the 1913 flood was determined from historical water marks. The 1959 flood reached an elevation of 797.0 feet NGVD with a discharge of 55,200 cfs and an estimated recurrence interval of 200 years (References 7 and 8). Damage from both floods was minimal due to the undeveloped nature of the area at the time.

2.4 Flood Protection Measures

No major flood protection structures exist in the city, and none are proposed at this time. The water supply reservoir, O'Shaughnessy on the Scioto River, located about 3.8 miles upstream of Dublin, does not include flood storage capacity in its design; therefore, its effect on flood peaks is negligible (References 6 and 7).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The magnitude of the discharges for the different frequencies was determined by methods of regional analyses (Reference 7). These base discharge figures were then adjusted for land uses in the watersheds and correlated with discharge-frequencies from nearby stream gaging stations. Peak discharges were reduced if the drainage area became significantly less upstream. Gages used in this study and their lengths of record are as follows: Scioto River below O'Shaughnessy Dam near Dublin, 57 years; Scioto River at Columbus, 56 years; Scioto Big Run at Briggsdale, 32 years; Mill Creek near Bellepoint, 36 years; O'Shaughnessy Reservoir near Dublin, 54 years; Griggs Reservoir at Columbus, 57 years; and, Olentangy River near Worthington, 23 years.

For streams studied by approximate methods, the magnitude of the 100-year flood was determined using the same techniques.

This study was revised using the data from the Flood Insurance Study for Franklin County (Reference 1). Peak discharges along the Scioto River were developed using the computer program "Flood Flow Frequency Analysis, Preliminary" (Reference 9).

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SCIOTO RIVER upstream of confluence of the Olentangy River	1,076	29,600	48,500	58,300	85,500
INDIAN RUN at confluence with the Scioto River	17.4	2,000	3,100	3,610	4,870
NORTH FORK INDIAN RUN at confluence with Indian Run	11.7	1,480	2,320	2,710	3,670
SOUTH FORK INDIAN RUN at confluence with Indian Run	5.7	950	1,490	1,750	2,370
TRIBUTARY S1 at mouth	2.2	480	760	900	1,210
TRIBUTARY S2 at mouth	1.8	490	750	870	1,120

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals.

Cross-section data for the Scioto River were obtained photogrammetrically from aerial photographs taken in April 1976. This information was obtained from the Flood Insurance Study for Franklin County (Reference 1).

Cross-section data for each of the other streams were obtained from aerial photographs and photogrammetric methods (Reference 10). Data for underwater sections were obtained by field measurements using the low water profile as datum. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map.

Roughness coefficients (Manning's "n") were estimated by inspection in the field, from aerial photographs (Reference 10), and from stereo slides of the stream reaches. Values of Manning's "n" used in this study are shown below.

	Main Channel	Flood Plain
Scioto River	0.018 - 0.062	0.040 - 0.118
Indian Run	0.025 - 0.05	0.055 - 0.1
North Fork Indian Run	0.025 - 0.05	0.055 - 0.1
South Fork Indian Run	0.025 - 0.05	0.055 - 0.1
Tributary S1	0.03 - 0.05	0.05 - 0.09
Tributary S2	0.04 - 0.05	0.055 - 0.07

Starting water-surface elevations for the Scioto River were determined from a rating at Griggs Dam about 5 miles downstream of the corporate limits, based on elevations at the dam and discharges at the gaging station on the Scioto River below O'Shaughnessy Dam near Dublin, with 57 years of record (References 7 and 8). Starting water-surface elevations for Indian Run, North Fork Indian Run, South Fork Indian Run, and Tributaries S1 and S2 were calculated using the slope-area method. All profiles of tributary streams were started at normal depth.

Water-surface profiles for the Scioto River for selected floods, floodway data, and flood insurance zone data were calculated through use of the computer program "New HEC-2, Error 62, Mod. 53, Water-Surface Profiles" (Reference 11).

Water-surface profiles for all other streams studied in detail were developed by means of the USGS step-backwater analyses program, E-431 (Reference 12), or the new provisional program J-635 (Reference 13), which was used on steep channels where E-431 would not give an elevation. Program J-635 attempts to seek a usable elevation by running an upstream and downstream profile for each frequency discharge in question in the reach.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

For streams studied by approximate methods, 100-year flood elevations were estimated based on regional stage-frequency relations (Reference 14) and refined where limited cross-section data were available by application of the Manning's equation using the bed slope as an approximation to the friction slope.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown on the profiles are, thus, considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods were delineated using elevations determined at each cross section. For the Scioto River, the boundaries between cross sections were interpolated using topographic mapping at a scale of 1:4800 (References 15 and 16). For other streams, the boundaries between cross sections were interpolated using the contour segments on base maps and stereo photographs with a scale of 1:4800 (Reference 10), USGS topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 17), and field observations of the area.

For the streams studied by approximate methods, the boundary of the 100-year flood was delineated using flood elevations determined at cross sections where they were available, depth-frequency curves for Ohio (Reference 14), and references and methods noted above.

For the streams studied by approximate methods, only the 100-year flood plain boundary is shown.

The 100- and 500-year flood plain boundaries are shown on the Flood Boundary and Floodway Map. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The floodways recommended for this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The widths, velocities, and surcharges of these initial results were examined and adjusted to provide smooth transitions in floodway width and location. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed and are presented in Table 2, Floodway Data.

As shown on the Flood Boundary and Floodway Map, the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown. In reaches of North Fork Indian Run, South Fork Indian Run, and Tributary S2, a floodway was not feasible where there were steep, narrow, high-walled gorges causing flow to be supercritical, and the 100-year flood confined within the channel. Only the 100- and 500-year floods are shown.

The area between the floodway and the 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SCIOTO RIVER								
A	142.09	668[2]	14,554	4.0	772.2	772.2	772.7	0.5
B	142.70	582[2]	15,974	3.6	772.9	772.9	773.4	0.5
C	144.04	591	10,983	5.3	775.9	775.9	776.3	0.4
D	144.35	438	7570	7.7	776.9	776.9	777.2	0.3
E	144.67	547[2]	8551	6.8	778.1	778.1	778.3	0.2
F	145.01	477[2]	9100	6.4	780.5	780.5	780.8	0.3
G	145.21	338[2]	6599	8.8	781.7	781.7	782.1	0.4
H	145.40	351	7441	7.8	783.8	783.8	784.2	0.4
I	145.66	539	10,064	5.8	785.4	785.4	785.9	0.5
J	145.97	468[2]	8927	6.5	786.8	786.8	787.3	0.5
K	146.20	317	7567	7.7	787.9	787.9	788.4	0.5
L	146.43	382	8101	7.2	789.4	789.4	789.9	0.5
M	146.68	339	7725	7.5	790.8	790.8	791.3	0.5
N	146.90	361	7432	7.8	792.4	792.4	792.7	0.3
O	147.18	344	7977	7.3	794.4	794.4	794.9	0.5
P	147.50	383[2]	7229	7.2	796.5	796.5	797.5	1.0

[1]MILES ABOVE MOUTH
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

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TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

FLOODWAY DATA

SCIOTO RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
INDIAN RUN								
A	610	300[3]	570	6.3	777.6	771.8	772.0	0.2
B	900	100[3]	462	7.8	777.6	776.4[2]	776.7	0.3
C	1150	110[3]	522	6.9	779.5	779.5	780.0	0.5
D	1370	110[3]	369	9.8	783.7	783.7	783.7	0.0
E	1650	120[3]	578	6.2	789.1	789.1	789.3	0.2
F	1980	46[3]	265	13.6	794.9	794.9	795.2	0.3
NORTH FORK INDIAN RUN								
G	4270	29	250	10.8	836.0	836.0	836.5	0.5
H	4680	52	307	8.8	839.9	839.9	840.4	0.5
I	5500	85	319	8.5	852.8	852.8	853.0	0.2
J	6580	104	530	5.1	863.1	863.1	863.6	0.5
K	7110	127	485	5.6	865.9	865.9	866.4	0.5
L	7910	177	590	4.6	871.3	871.3	871.8	0.5
M	10,130	96	724	3.7	884.1	884.1	884.2	0.1
N	10,220	76	426	6.4	884.1	884.1	884.2	0.1
O	10,760	185	865	3.1	885.1	885.1	885.6	0.5
P	11,310	288	1342	2.0	885.5	885.5	886.0	0.5
Q	12,660	350	327	8.3	887.1	887.1	887.5	0.4
R	13,300	350	930	2.9	889.8	889.8	889.9	0.1
S	13,880	200	934	2.9	890.6	890.6	890.8	0.2
T	14,400	200	818	3.3	891.4	891.4	891.8	0.4
U	15,080	200	759	2.8	892.6	892.6	893.0	0.4
V	15,400	200	750	2.8	893.2	893.2	893.5	0.2
W	15,650	200	924	2.3	893.5	893.5	893.8	0.3
X	16,180	200	797	2.6	893.9	893.9	894.3	0.4
Y	16,470	150	645	2.8	894.3	894.3	894.8	0.5
Z	16,540	150	739	2.8	895.3	895.3	895.4	0.1

[1]FEET ABOVE CONFLUENCE WITH SCIOTO RIVER
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM SCIOTO RIVER
[3]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

REVISED: 10/17/89

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

FLOODWAY DATA

INDIAN RUN - NORTH FORK INDIAN RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
NORTH FORK INDIAN RUN								
AA	16,630	125	586	3.6	895.4	895.4	895.4	0.0
AB	17,050	125	389	5.4	896.5	896.5	896.6	0.1
AC	17,600	100	438	4.8	899.0	899.0	899.4	0.4
AD	18,120	100	377	5.6	900.9	900.9	901.4	0.5
AE	18,210	100	398	5.3	901.5	901.5	901.8	0.3
AF	18,350	100	448	4.7	902.3	902.3	902.5	0.2
AG	19,150	100	306	6.8	906.8	906.8	906.8	0.0
AH	19,920	100	516	4.1	910.3	910.3	910.8	0.5
AI	20,060	100	557	3.8	911.6	911.6	912.1	0.5
AJ	21,000	100	536	3.9	912.2	912.2	912.7	0.5
AK	21,410	100	518	4.0	912.9	912.9	913.4	0.5
AL	21,620	100	673	3.1	915.2	915.2	915.2	0.0
AM	21,950	100	523	4.0	915.4	915.4	915.5	0.1
AN	22,120	150	829	2.5	916.2	916.2	916.2	0.0
AO	22,980	125	611	3.4	916.7	916.7	916.9	0.2
AP	23,860	125	553	3.8	917.7	917.7	918.1	0.4
AQ	24,850	100	511	4.1	919.1	919.1	919.5	0.4

[1]FEET ABOVE CONFLUENCE WITH SCIOTO RIVER

REVISED: 10/17/89

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

FLOODWAY DATA

NORTH FORK INDIAN RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SOUTH FORK INDIAN RUN								
D	1090	45	171	10.2	853.8	853.8	853.8	0.0
E	1400	125	651	2.7	856.9	856.9	857.4	0.5
F	1600	125	506	3.5	857.3	857.3	857.8	0.5
G	1860	125	510	3.4	858.2	858.2	858.5	0.3
H	2100	125	405	4.3	858.8	858.8	859.1	0.3
I	2290	200	565	3.1	860.4	860.4	860.5	0.1
J	2740	100	421	4.2	861.5	861.5	861.8	0.3
K	3350	100	306	5.7	864.4	864.4	864.8	0.4
L	3930	75	277	6.3	869.0	869.0	869.1	0.1
M	4060	45	194	9.0	869.7	869.7	870.0	0.3
N	4400	100	407	4.3	872.7	872.7	872.9	0.2
O	4710	175	781	2.2	875.0	875.0	875.4	0.4
P	4960	150	575	3.0	875.4	875.4	875.8	0.4
Q	5050	101	498	3.5	877.7	877.7	877.7	0.0
R	5200	96	426	4.1	878.2	878.2	878.6	0.4
S	5880	136	518	3.4	880.6	880.6	881.1	0.5
T	6500	165	545	3.2	882.4	882.4	882.9	0.5
U	7190	62	273	6.4	886.2	886.2	886.6	0.4
V	7320	150	489	3.6	887.9	887.9	888.3	0.4
W	7690	150	412	4.2	890.2	890.2	890.3	0.1
X	8050	150	577	3.0	891.7	891.7	892.1	0.4
Y	8160	150	655	2.7	892.0	892.0	892.4	0.4

[1]FEET ABOVE CONFLUENCE WITH INDIAN RUN

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

FLOODWAY DATA

SOUTH FORK INDIAN RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SOUTH FORK INDIAN RUN								
Z	8510	150	613	2.8	892.6	892.6	893.0	0.4
AA	8980	90	308	5.7	893.9	893.9	894.2	0.3
AB	9390	90	344	5.1	896.2	896.2	896.4	0.2
AC	9490	200	900	1.9	897.6	897.6	897.9	0.3
AD	9890	150	657	2.7	897.8	897.8	898.2	0.4
AE	10,390	125	586	3.0	898.3	898.3	898.8	0.5
AF	10,840	100	255	6.9	900.4	900.4	900.6	0.2
AG	10,920	125	457	3.8	902.5	902.5	902.5	0.0
AH	11,480	125	414	4.2	904.3	904.3	904.6	0.3
AI	12,120	100	462	3.8	906.3	906.3	906.7	0.4
AJ	12,590	100	393	4.4	907.4	907.4	907.9	0.5
AK	13,120	100	408	4.3	909.3	909.3	909.7	0.4
AL	13,170	125	678	2.6	913.4	913.4	913.4	0.0
AM	13,780	125	621	2.8	913.6	913.6	913.9	0.3
AN	14,400	125	505	3.5	914.1	914.1	914.6	0.5

[1]FEET ABOVE CONFLUENCE WITH INDIAN RUN

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

FLOODWAY DATA

SOUTH FORK INDIAN RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
TRIBUTARY S1								
A	700	22	87	10.4	800.9	800.9	801.4	0.5
B	920	43	221	4.1	808.5	808.5	809.0	0.5
C	1250	45	110	8.2	817.3	817.3	817.6	0.3
D	1540	20	89	10.1	828.2	828.2	828.3	0.1
E	1890	35	111	8.1	834.8	834.8	835.1	0.3
F	2030	21	81	11.1	838.3	838.3	838.6	0.3
G	2210	26	101	8.9	842.1	842.1	842.6	0.5
H	2350	50	179	5.0	844.1	844.1	844.6	0.5
I	2580	60	143	6.3	846.2	846.2	846.3	0.1
J	3010	60	141	6.1	852.0	852.0	852.2	0.2
K	3610	80	239	3.8	856.7	856.7	856.9	0.2
L	4030	80	171	5.2	859.4	859.4	859.8	0.4
M	4420	88	206	4.4	863.3	863.3	863.6	0.3
N	4620	70	179	5.0	886.3	866.3	866.8	0.5
O	5190	80	182	5.0	871.1	871.1	871.6	0.5
P	5920	75	158	5.7	878.2	878.2	878.4	0.2
Q	6740	36	160	5.6	883.4	883.4	883.9	0.5
R	7400	75	154	5.9	887.8	887.8	888.0	0.2
S	7840	59	246	2.6	889.9	889.9	889.9	0.0
T	8280	41	80	7.9	891.4	891.4	891.7	0.3
U	8460	129	337	1.9	896.1	896.1	896.6	0.5
V	9430	18	70	9.0	900.1	900.1	900.5	0.4

[1]FEET ABOVE MOUTH

REVISED: 10/17/89

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

FLOODWAY DATA

TRIBUTARY S1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
TRIBUTARY S2								
D	1610	18	81	10.7	835.8	835.8	836.3	0.5
E	1790	29	124	7.0	841.2	841.2	841.7	0.5
F	2020	29	131	6.6	844.3	844.3	844.8	0.5
G	2410	49	193	4.5	847.6	847.6	848.1	0.5
H	2830	43	111	7.8	851.4	851.4	851.9	0.5
I	2900	90	356	2.4	853.4	853.4	853.9	0.5
J	3220	29	90	9.7	855.3	855.3	855.3	0.0
K	3400	79	356	2.4	856.8	856.8	857.3	0.5
L	3700	60	172	5.1	859.0	859.0	859.2	0.2
M	3890	284	986	0.9	860.3	860.3	860.4	0.1
N	4130	80	124	7.0	861.2	861.2	861.5	0.3
O	4400	90	281	3.1	865.4	865.4	865.6	0.2
P	4680	84	147	5.9	867.3	867.3	867.3	0.0

[1]FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

FLOODWAY DATA

TRIBUTARY S2

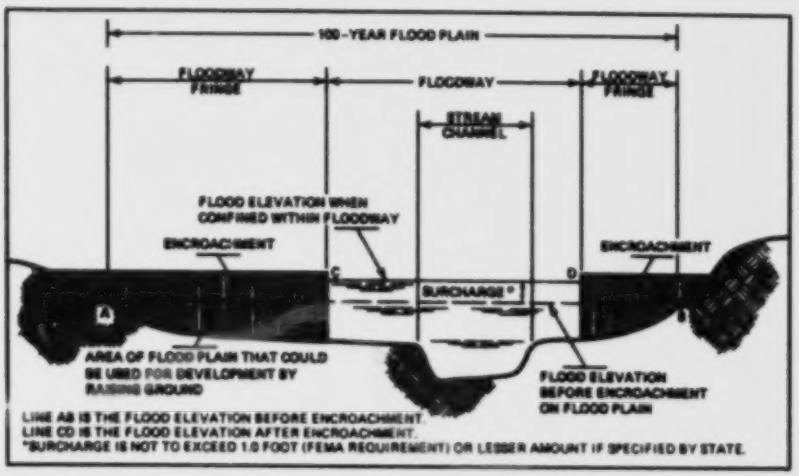
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the Village of Dublin.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the weighted average difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the Village of Dublin are shown on the Flood Profiles and are summarized in Table 3, Flood Insurance Zone Data.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a riverine reach is the weighted average difference between the 10- and 100-year flood water-surface elevations rounded to the nearest 0.5 foot, multiplied by 10, and shown as a 3-digit code. For example, if the difference between elevations is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique number is associated with each possible FHF and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zones A2, A3, A12:	Special Flood Hazard Areas inundated by the 100-year flood, with base flood elevations shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- and 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and, areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.

Table 3, Flood Insurance Zone Data, summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
SCIOTO RIVER							
REACH 1[4]	0002,0004,0007 0008	−6.1	−2.0	3.9	060	A12	VARIES–SEE MAP
INDIAN RUN							
REACH 1	0006	−1.4	−0.5	1.2	015	A3	VARIES–SEE MAP
NORTH FORK INDIAN RUN							
REACH 1	0003,0004,0006	−1.3	−0.4	0.8	015	A3	VARIES–SEE MAP
SOUTH FORK INDIAN RUN							
REACH 1	0006,0007	−1.2	−0.4	0.6	010	A2	VARIES–SEE MAP
TRIBUTARY S1							
REACH 1	0006,0007	−1.0	−0.3	0.5	010	A2	VARIES–SEE MAP
TRIBUTARY S2							
REACH 1	0004	−1.1	−0.3	0.4	010	A2	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL.
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT
[4]DATA FOR THIS REACH TAKEN FROM THE UNINCORPORATED AREAS OF FRANKLIN COUNTY FIS

REVISED: 9/4/85

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

FLOOD INSURANCE ZONE DATA

SCIOTO RIVER - INDIAN RUN - NORTH FORK INDIAN RUN - SOUTH FORK INDIAN RUN - TRIBUTARIES S1 & S2

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of Dublin is, for insurance purposes, the principal product of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines for riverine flooding sources show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

The USGS has published a Hydrologic Atlas (Reference 6) documenting the January 1959 flood on the Scioto River and four floodprone area maps (Reference 18) outlining the estimated 100-year flood on the Scioto River and sections of Indian Run in Dublin. FEMA has published Flood Insurance Studies for the Unincorporated Areas of Franklin County, the City of Columbus, Franklin County, and Delaware County, Unincorporated Areas, Ohio (References 1, 19, and 20). The Scioto-Sandusky Conservancy District (Reference 5) published a report in 1951 that contained a 1913 high water profile on the Scioto River at Dublin. The COE has published a Flood Plain Information report on the Scioto River at Columbus up to Griggs Dam, which is about 6 miles below Dublin (Reference 21). This report agrees with the above referenced reports in Dublin.

This Flood Insurance Study Revision supersedes the previously published Flood Insurance Study for the Village of Dublin (Reference 22).

7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, Chicago, Illinois 60606.

8.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Study, Franklin County, Unincorporated Areas, Ohio, July 1983.

2. Ohio Department of Economic and Community Development, Federal Census of Population, Ohio, April 1980.

3. U.S. Geological Survey, Miscellaneous Geologic Investigations, Map I-316, Glacial Map of Ohio, R.P. Goldthwait, G.W. White, and J.L. Forsyth, 1967.

4. Ohio Department of Natural Resources, Ohio Division of Water, Ohio Water Plan Inventory Report 13, Hydrologic Atlas of Average Annual Precipitation, Temperature, Streamflow, and Water Loss in Ohio, 1962.

5. Scioto-Sandusky Conservancy District, Official Plan, Volume II, January 1951.

6. U.S. Geological Survey, Hydrologic Investigations Atlas HA-52, Floods at Columbus, Ohio, 1962.

7. ———, Open-File Report 76-768, Floods in Ohio - Magnitude and Frequency, E.E. Webber and W.P. Bartlett, Jr., December 1976.

8. ———, Water-Data Report OH-77-1, Water Resources Data for Ohio, Water Year 1977, Volume 1, Ohio River Basin, 1977.

9. ———, Computer Program, Flood Flow Frequency Analysis, Preliminary, October 1976.

10. Kucera and Associates, Inc., Mentor, Ohio, Aerial Photogrammetric Map, Scale 1:4800; Dublin, Ohio, March 1977.

11. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Computer Program, NEW HEC-2, Error 62, Mod. 53, Water-Surface Profiles, October 1977.

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13. ———, User's Guide Step-backwater and Floodway Analyses, Computer Program J-635, Provisional, J.O. Shearman, May 1977.

14. ———, Open-File, National Program for Managing Flood Losses; Guidelines for Preparation, Transmittal, and Distribution of Flood-Prone Area Maps and Pamphlets, George W. Edlen, Jr., 1973.

15. U.S. Department of Agriculture, Soil Conservation Service, Flood Hazard Analyses Report for Blacklick Creek, October 1975.

16. Scioto Conservancy District, Topographic Mapping, Scale 1:4800, Contour Interval 2 feet: April 1962.

17. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 feet: Northwest Columbus, Ohio, 1973; Hilliard, Ohio, 1973; Powell, Ohio, 1973; and Shawnee Hills, Ohio, 1973.

18. ———, Maps of Flood Prone Areas, Scale 1:24000: Northwest Columbus, Ohio, 1973; Hilliard, Ohio, 1974; Powell, Ohio, 1973; and Shawnee Hills, Ohio, 1973.

19. Federal Emergency Management Agency, Flood Insurance Study, City of Columbus, Franklin County, Ohio, July 1983.

20. ———, Flood Insurance Study, Delaware County, Unincorporated Areas, Ohio, October 1983.

21. U.S. Army Corps of Engineers, Huntington District, Main Report and Columbus Area Summary Report, Flood Plain Information, Scioto and Olentangy Rivers, Ohio, October 1966.

22. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Village of Dublin, Franklin, Delaware, and Union Counties, Oh. , June 1980.

Ohio Department of Natural Resources, Ohio Division of Water, Plan Inventory Report 12a, Drainage Areas of Ohio Streams, Supplement to Gazeteer of Ohio Streams, William P. Cross, 1967.

9.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the Village of Dublin City Hall, 6665 Coffman Road, Dublin, Ohio.

9.1 First Revision (Revised October 17, 1989)

a. Acknowledgments

The hydraulic analyses for this Revisions Description were performed by Evans, Mechwart, Hambleton & Tilton, Inc, (EMH&T). The Federal Emergency Management Agency reviewed and accepted these data for purposes of this revision.

b. Scope

North Fork Indian Run was restudied from the corporate limits of the Village of Dublin just downstream of Brandonway Drive to a point just downstream of Brand Road. This restudy was performed in order to delineate new 100- and 500-year flood and floodway boundaries in areas of North Fork Indian Run previously studied by detailed methods. Also, because of corporate limit changes, additional flooding information on North Fork Indian Run and Tributary S1 was included from the Flood Insurance Study for Franklin County, Ohio (Reference 23).

c. Hydrologic and Hydraulic Analyses

The hydrologic analyses for the original Flood Insurance Study were not revised. This revision used the same flow rates as those used in the original study. The revised hydraulic analyses for the 10-, 50-, 100-, and 500-year floods for North Fork Indian Run were performed using the J635 step-backwater computer program (Reference 24). Revised topographic information provided by EMH&T was included in the hydraulic analyses at several cross sections (Reference 25). Channel roughness coefficients (Manning's "n") and the starting water-surface elevations from the original hydraulic analyses were not revised.

d. Floodways

Floodway computations for North Fork Indian Run were revised as a result of the restudy by EMH&T. The floodways were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was revised and are presented in Table 2, Floodway Data.

e. Other Studies

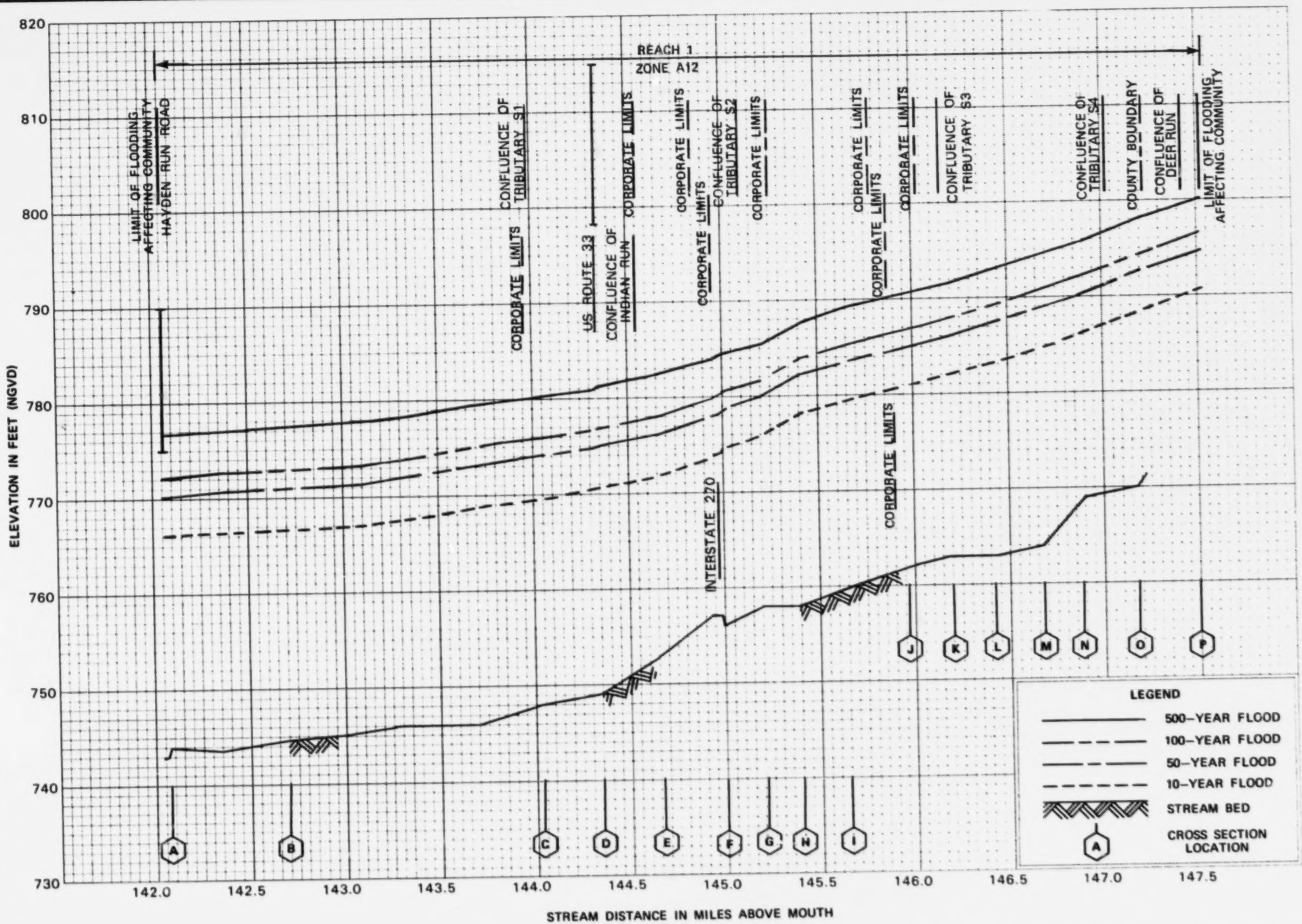
Due to corporate limits changes in the Village of Dublin, this Flood Insurance Study is not in agreement with the Flood Insurance Study for Franklin County, Ohio (Reference 23). When the Franklin County Flood Insurance Study is revised, the new corporate limits information will be included.

f. References and Bibliography

23. Federal Emergency Management Agency, Flood Insurance Study, Franklin County, Unincorporated Areas, Ohio, January 1987.

24. U.S. Department of the Interior, Geological Survey, User's Guide, Step-Backwater and Floodway Analyses, J.O. Shearman, May 1977.

25. Evans, Mechwart, Hambleton & Tilton, Inc., untitled topographic map of Brandon Residential Development, Scale 1:600, Contour Interval 1 Foot: revised July 21, 1988.



FLOOD PROFILES

SCIOTO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

01P

REVISED: 9 4 85

SCIOTO RIVER BACKWATER
ZONE A12

REACH 1
ZONE A3

CONFLUENCE WITH SCIOTO RIVER

HIGH STREET
EL 810.5

ELEVATION IN FEET (NGVD)

785
780
775
770
765
760
755

0 100 200 300 400 500 600 700 800 900 1000 1100 1200

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SCIOTO RIVER

A B C

LEGEND
- 500–YEAR FLOOD
- 100–YEAR FLOOD
- 50–YEAR FLOOD
- 10–YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

FLOOD PROFILES

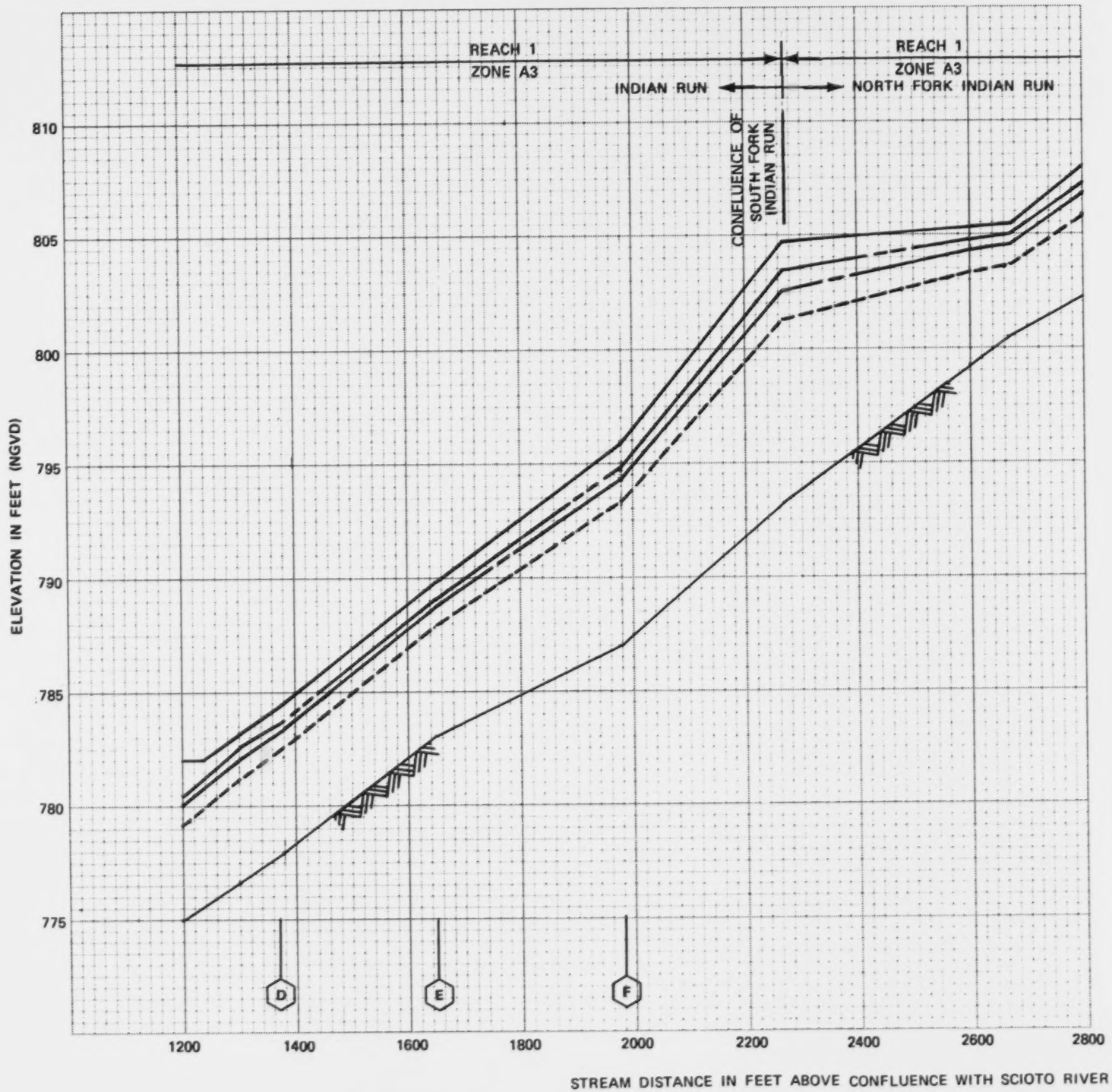
INDIAN RUN

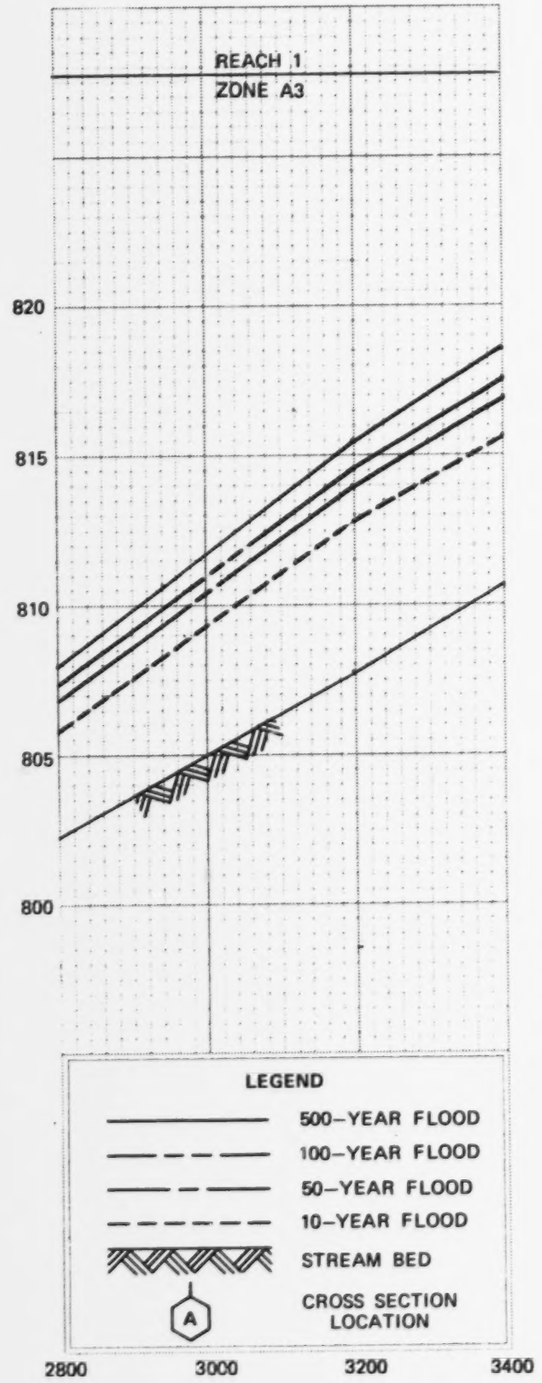
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

02P

REVISED: 9/4/85





FLOOD PROFILES

INDIAN RUN - NORTH FORK INDIAN RUN

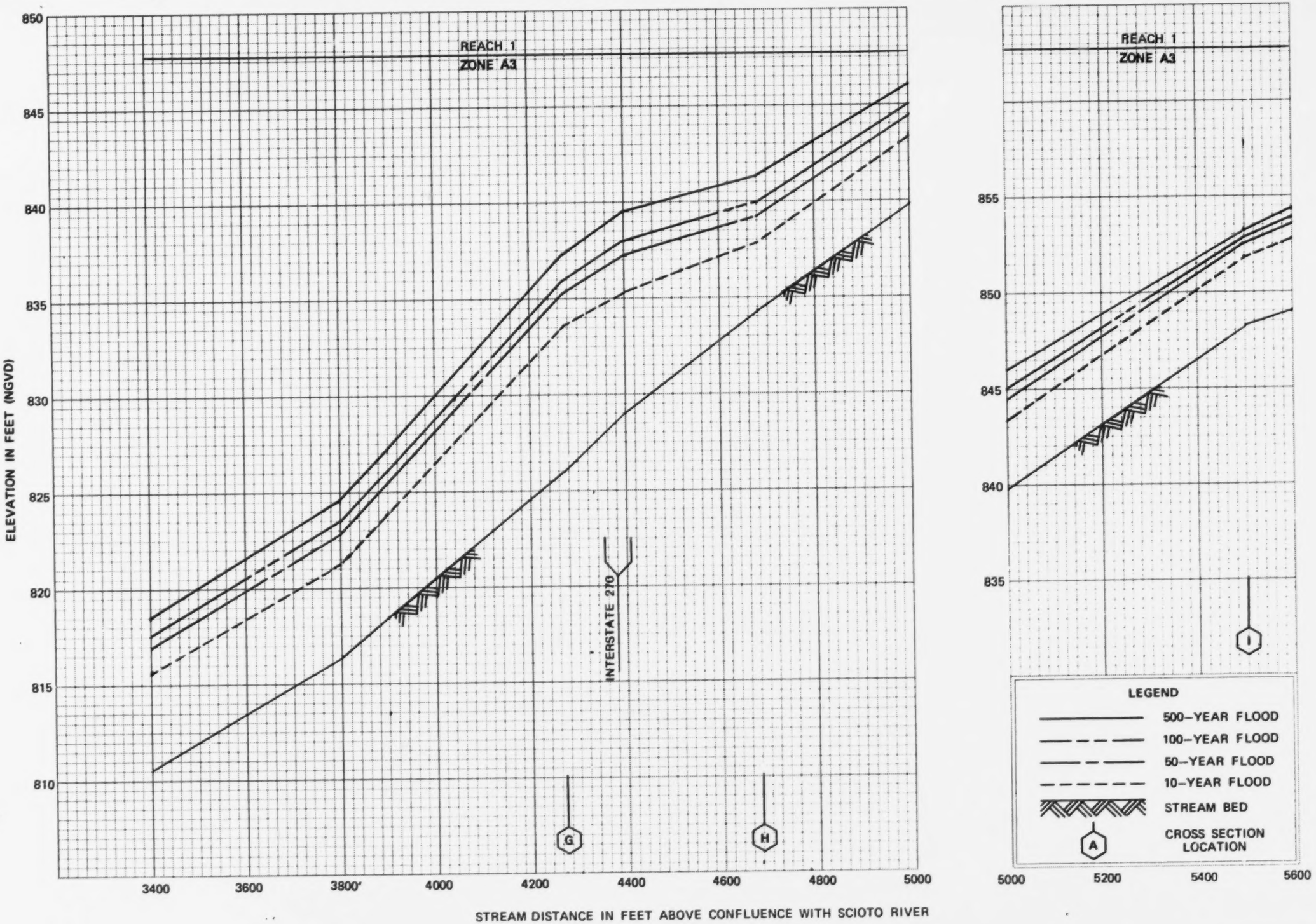
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

03P

REVISED: 9/4/85



FLOOD PROFILES

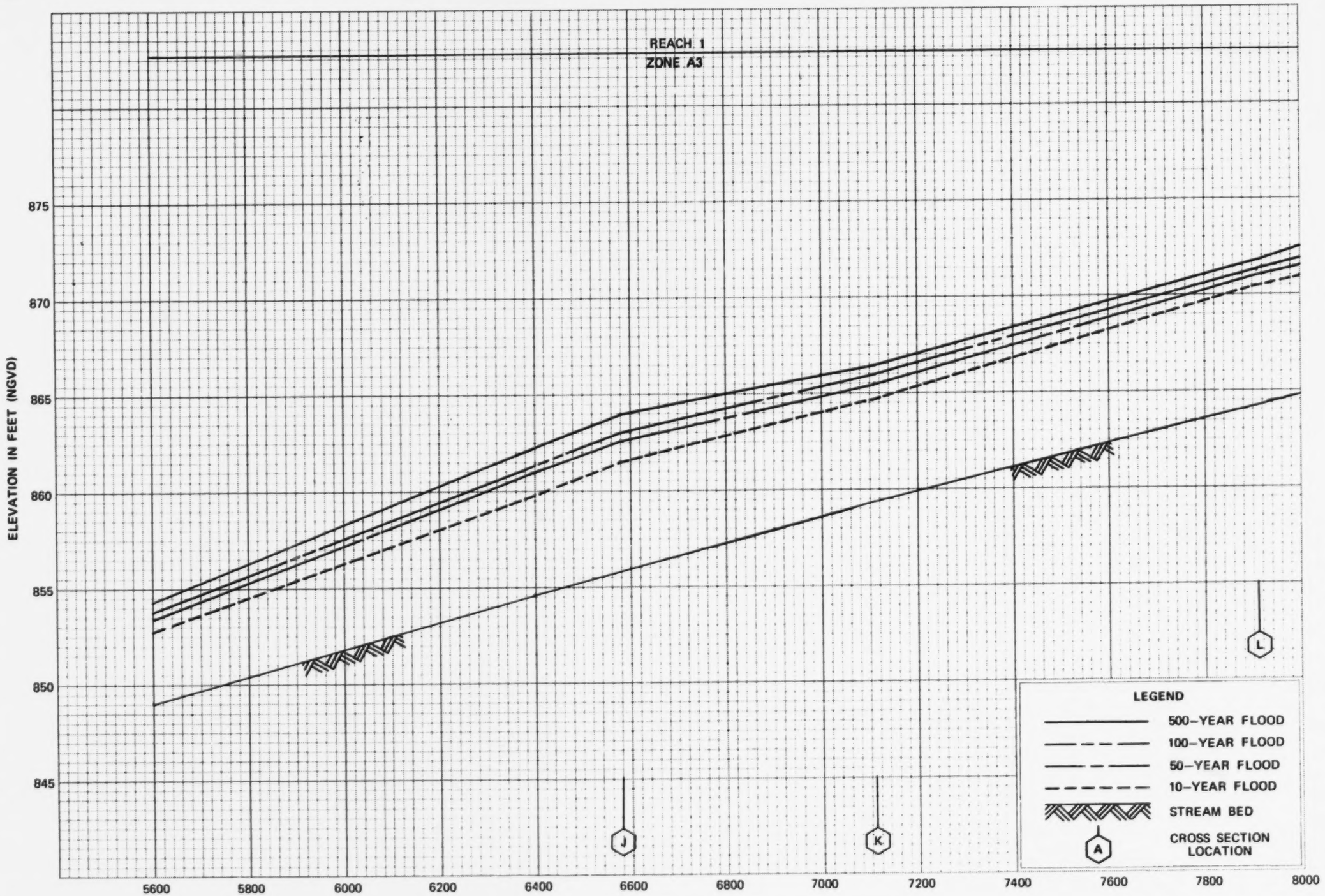
NORTH FORK INDIAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

04P



FLOOD PROFILES

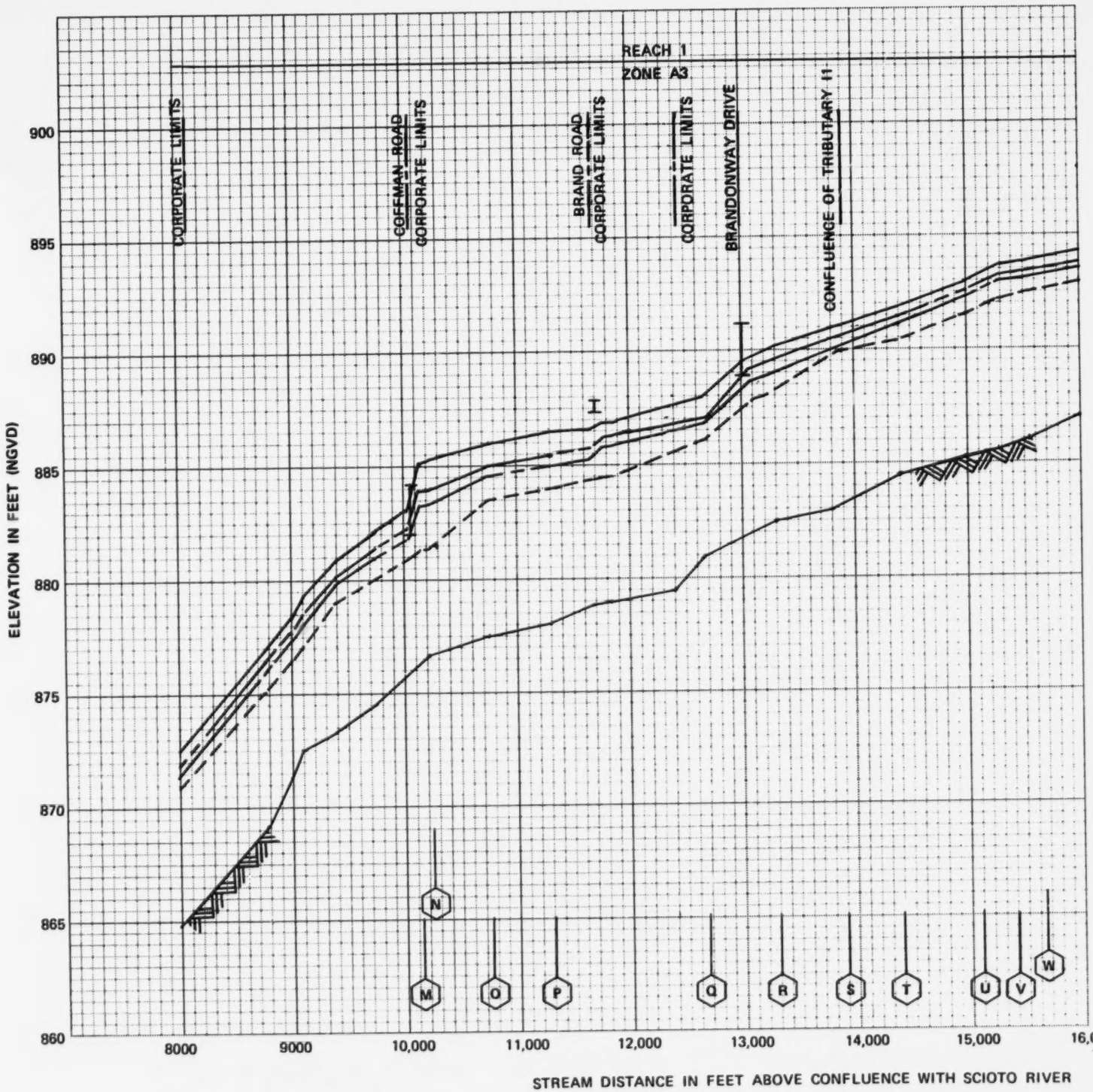
NORTH FORK INDIAN RUN

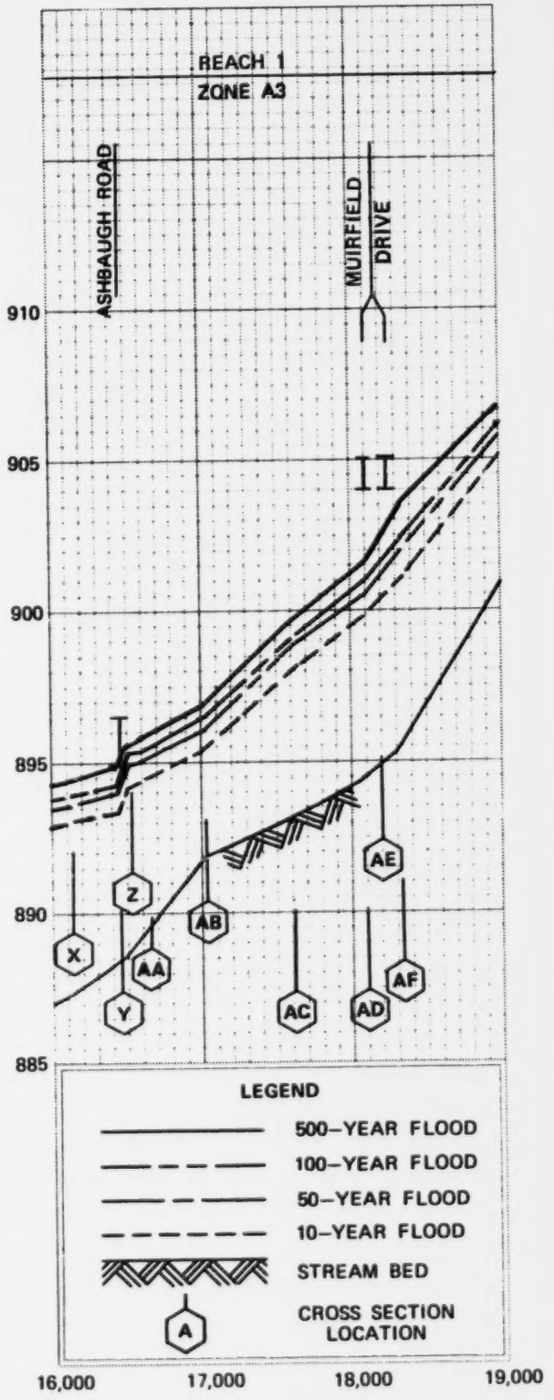
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

05P

REVISED: 10-17-80





FLOOD PROFILES

NORTH FORK INDIAN RUN

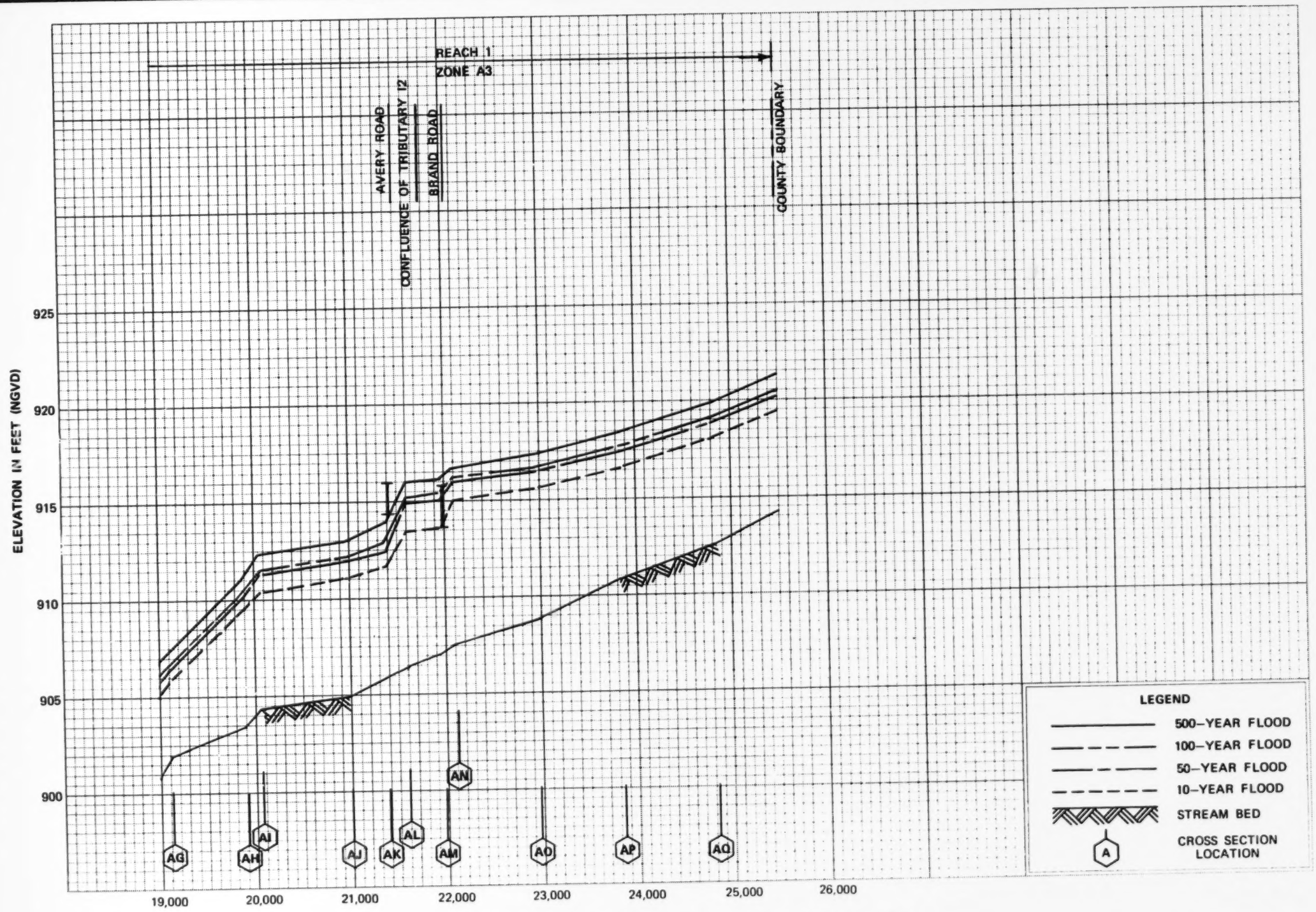
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

06P

REVISED 10 17 89



FLOOD PROFILES

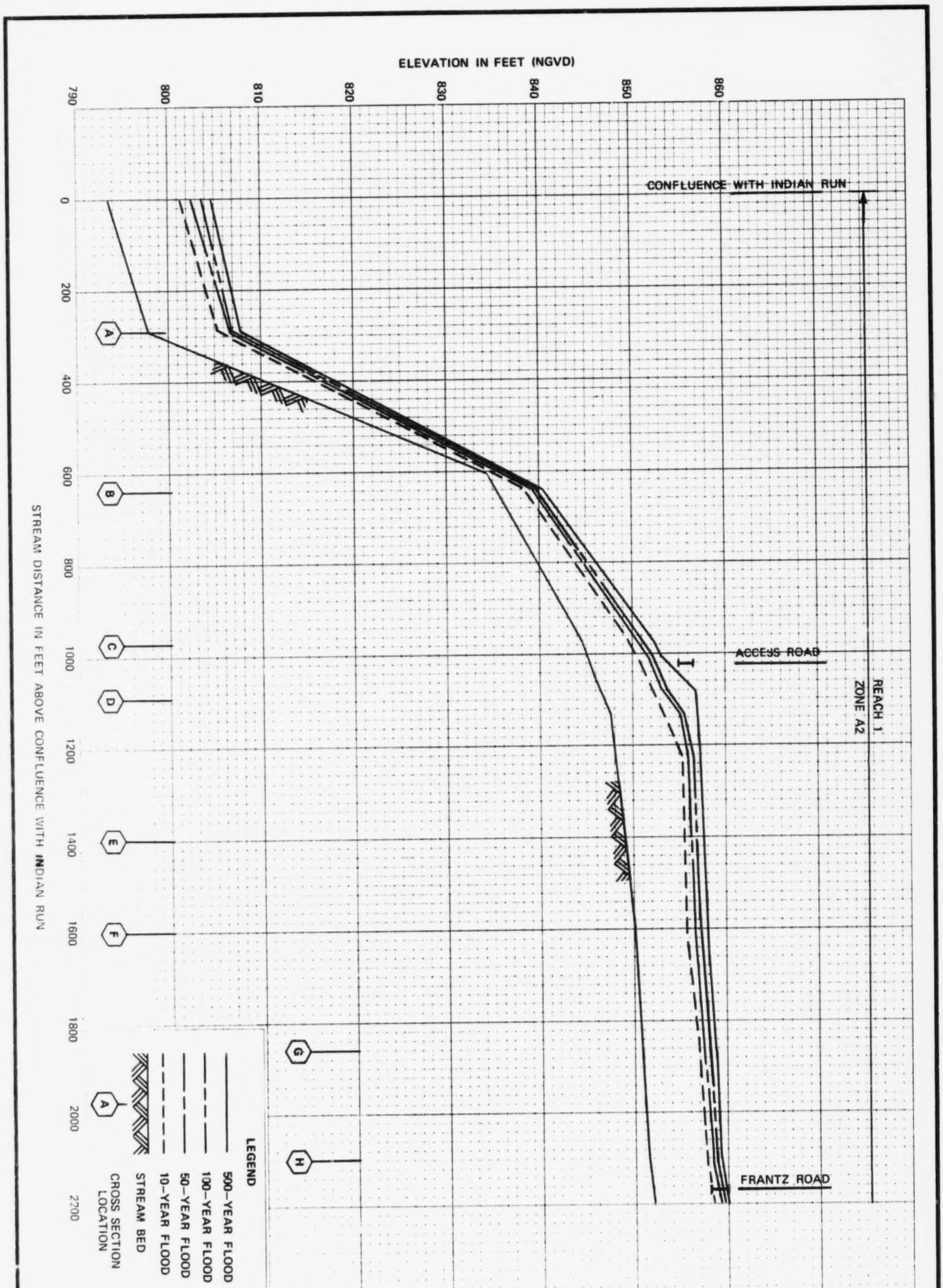
NORTH FORK INDIAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

07P



FEDERAL EMERGENCY MANAGEMENT AGENCY

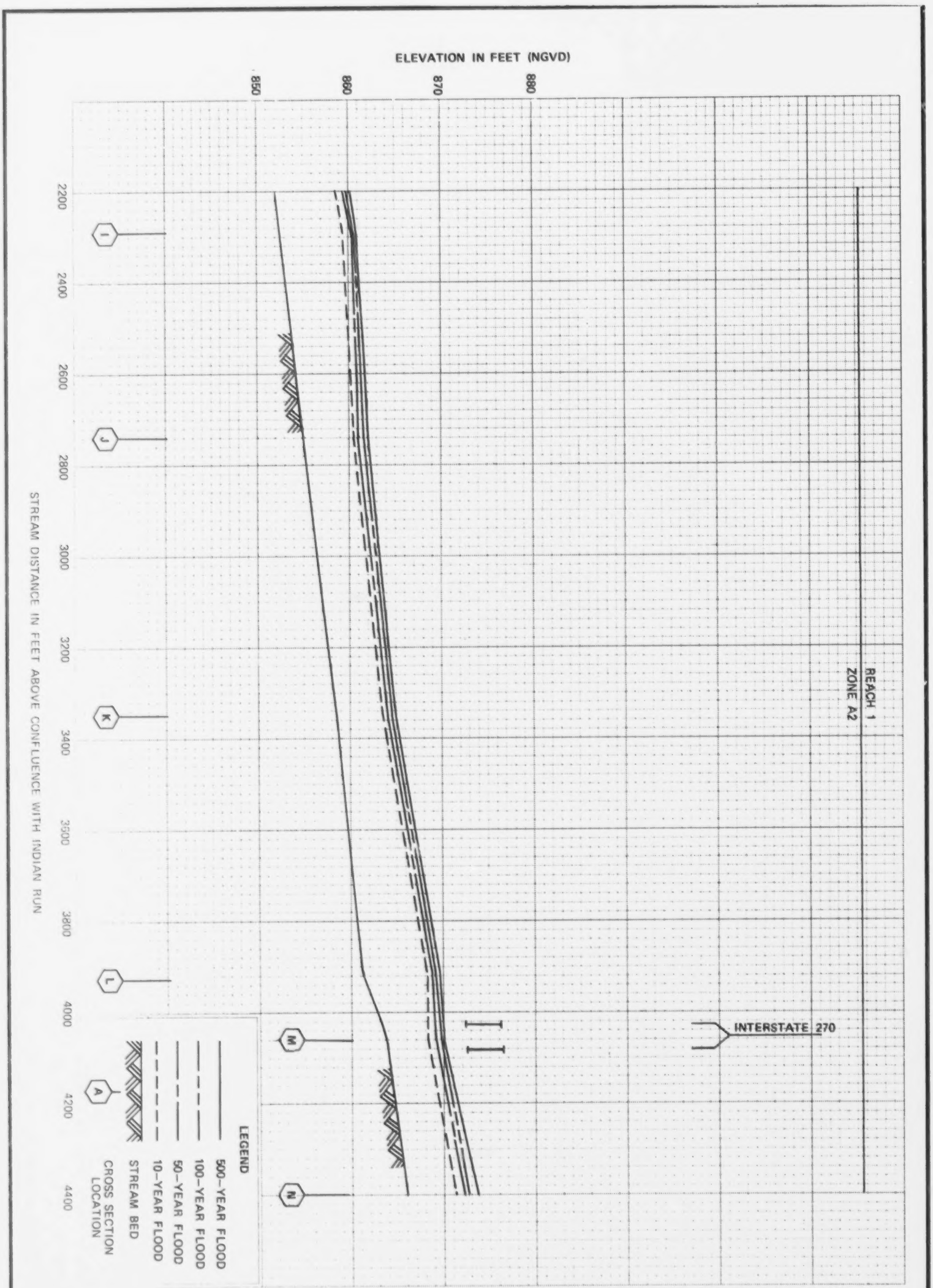
VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

FLOOD PROFILES

SOUTH FORK INDIAN RUN

08P

32



33

09P

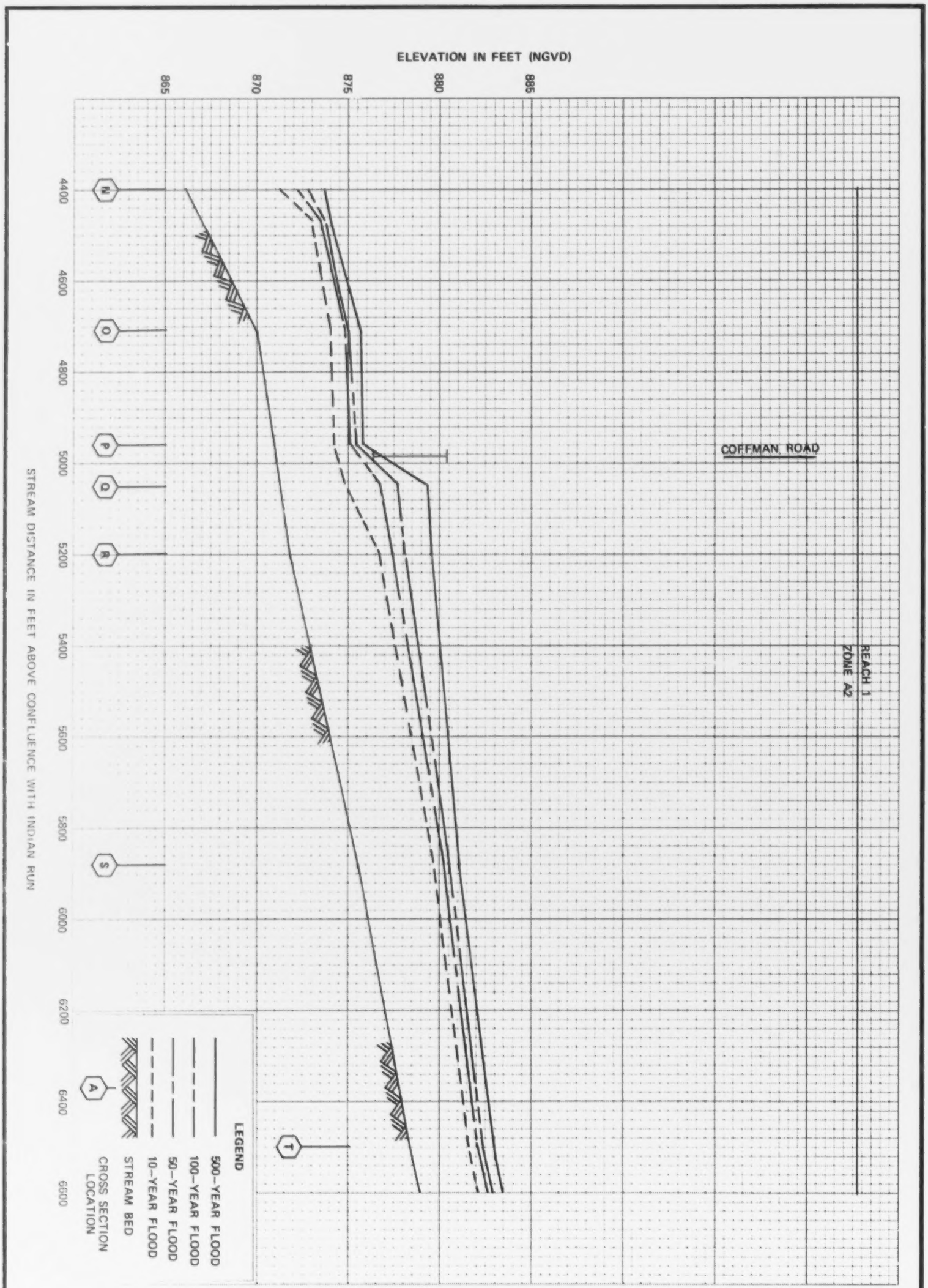
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

FLOOD PROFILES

SOUTH FORK INDIAN RUN



10P

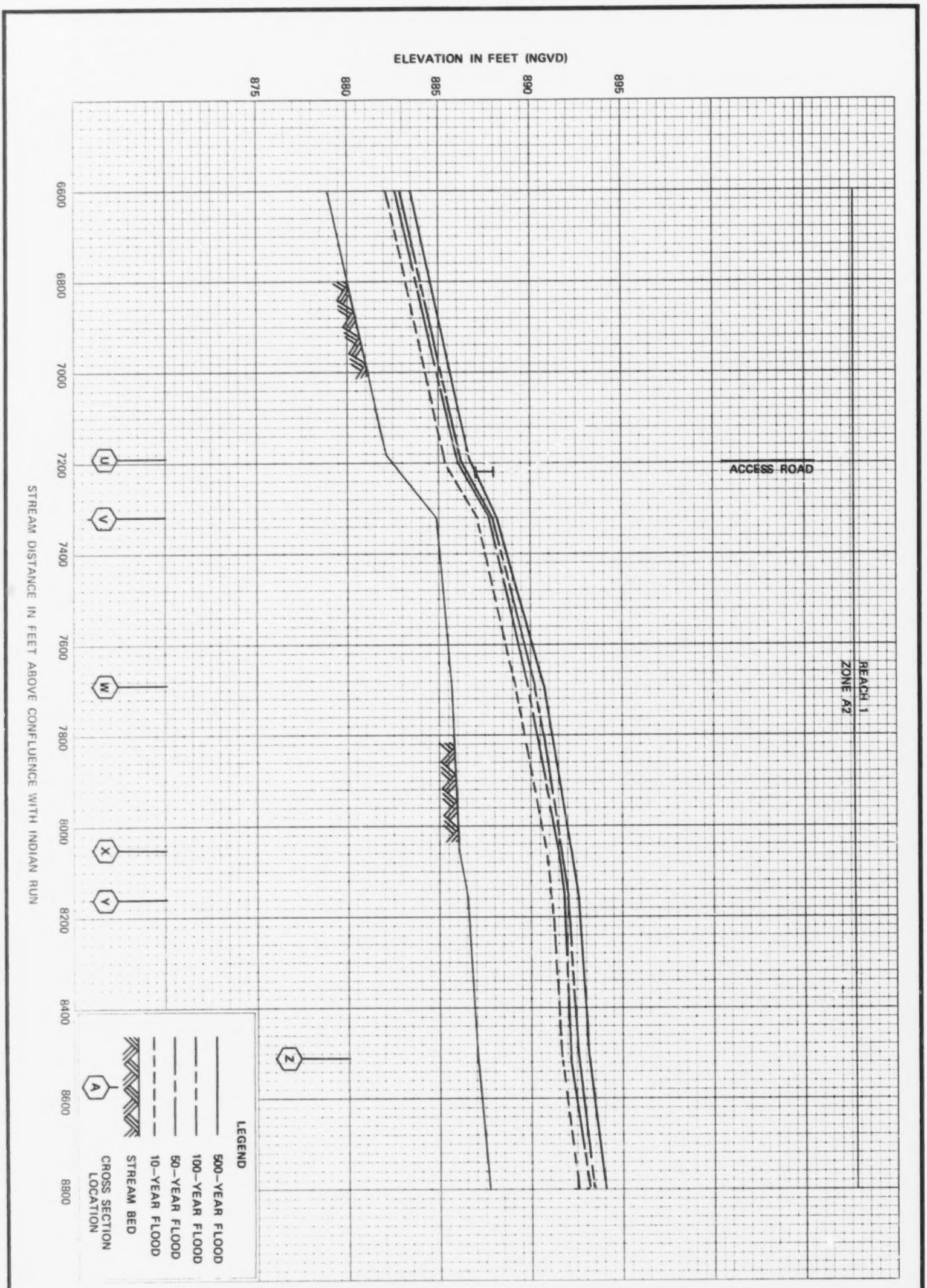
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

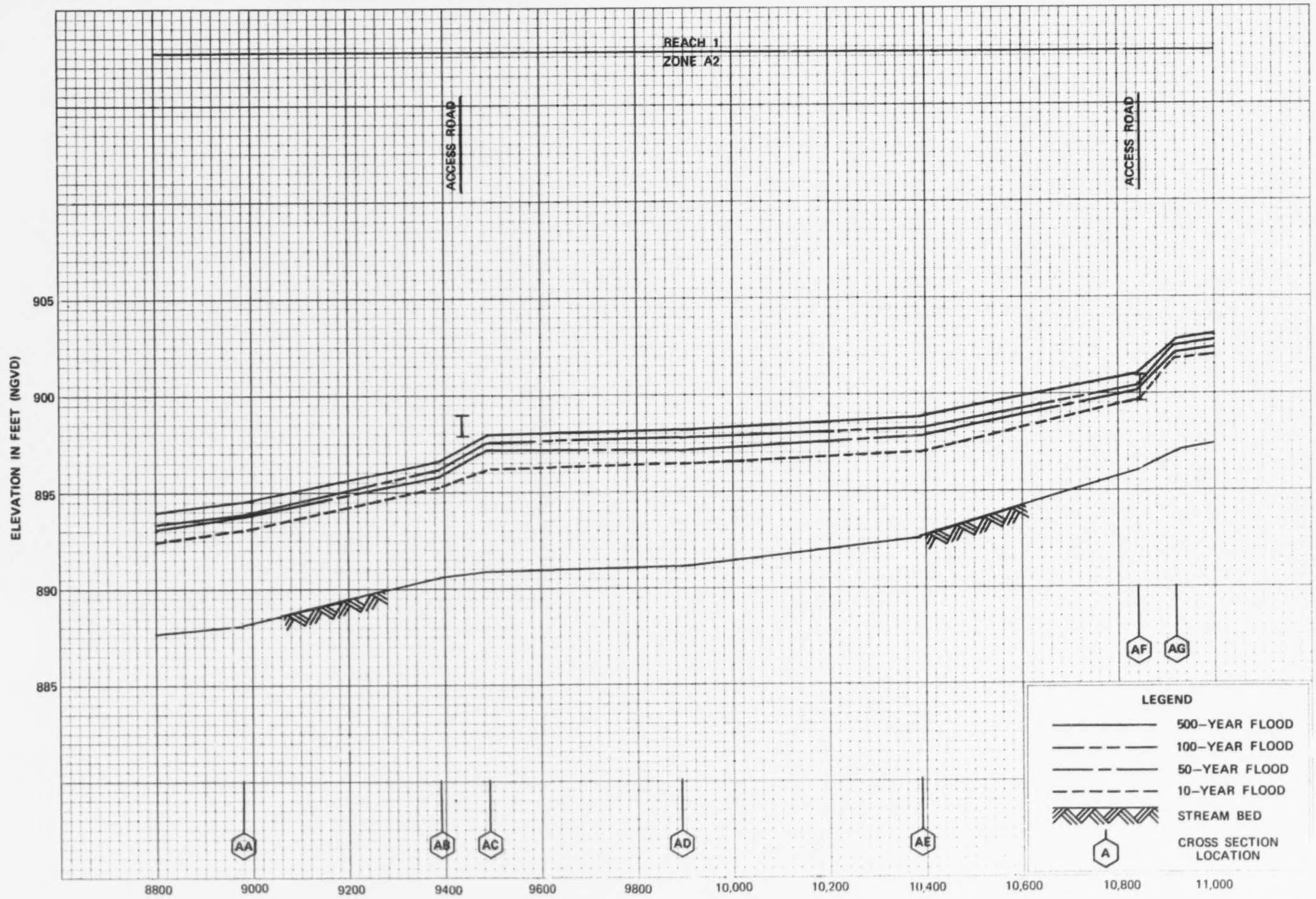
FLOOD PROFILES

SOUTH FORK INDIAN RUN



35

11P	FEDERAL EMERGENCY MANAGEMENT AGENCY **VILLAGE OF DUBLIN, OH** (FRANKLIN, DELAWARE AND UNION COS.)	**FLOOD PROFILES** **SOUTH FORK INDIAN RUN**



FLOOD PROFILES

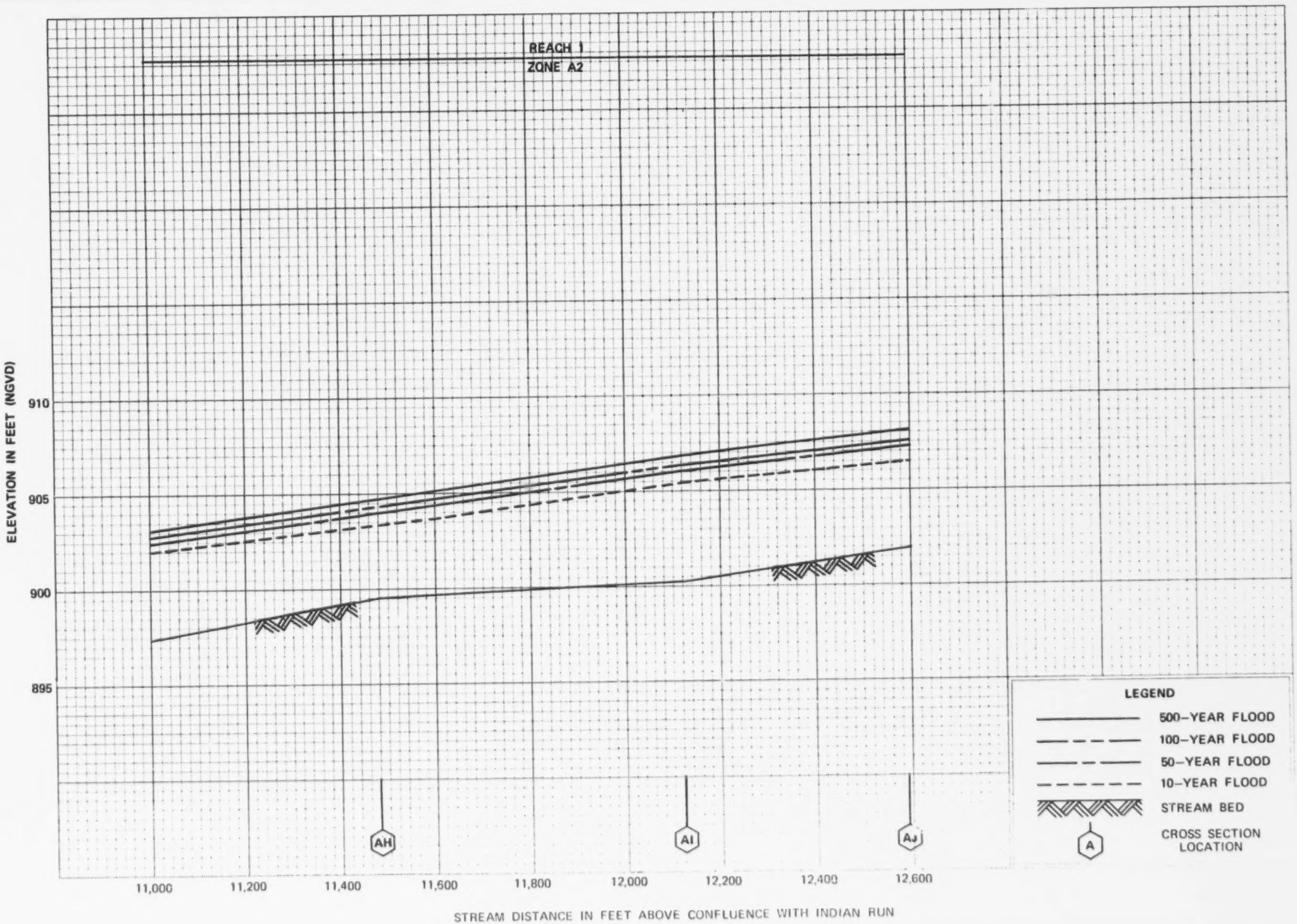
SOUTH FORK INDIAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

12P



FLOOD PROFILES

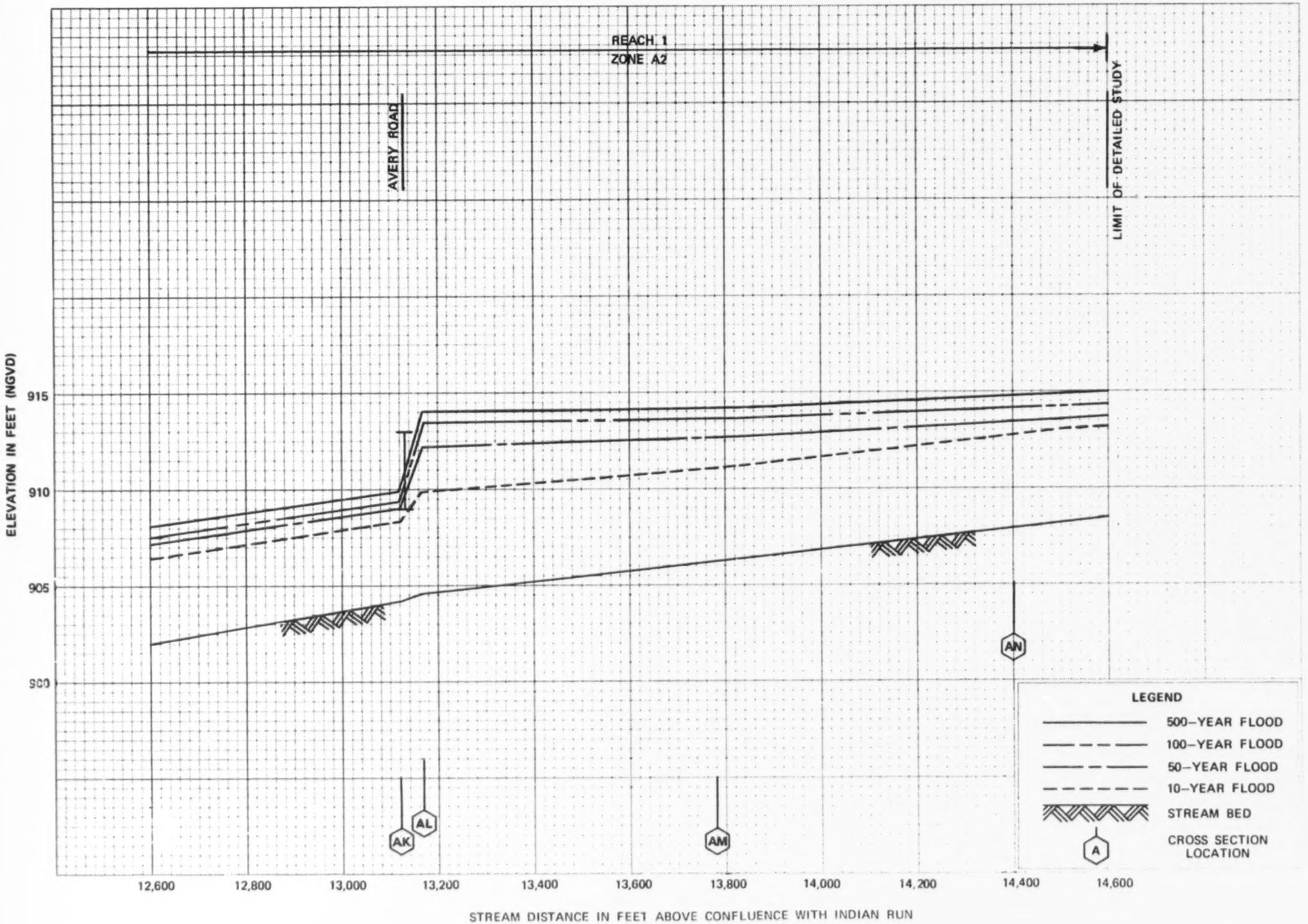
SOUTH FORK INDIAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

13P



FLOOD PROFILES

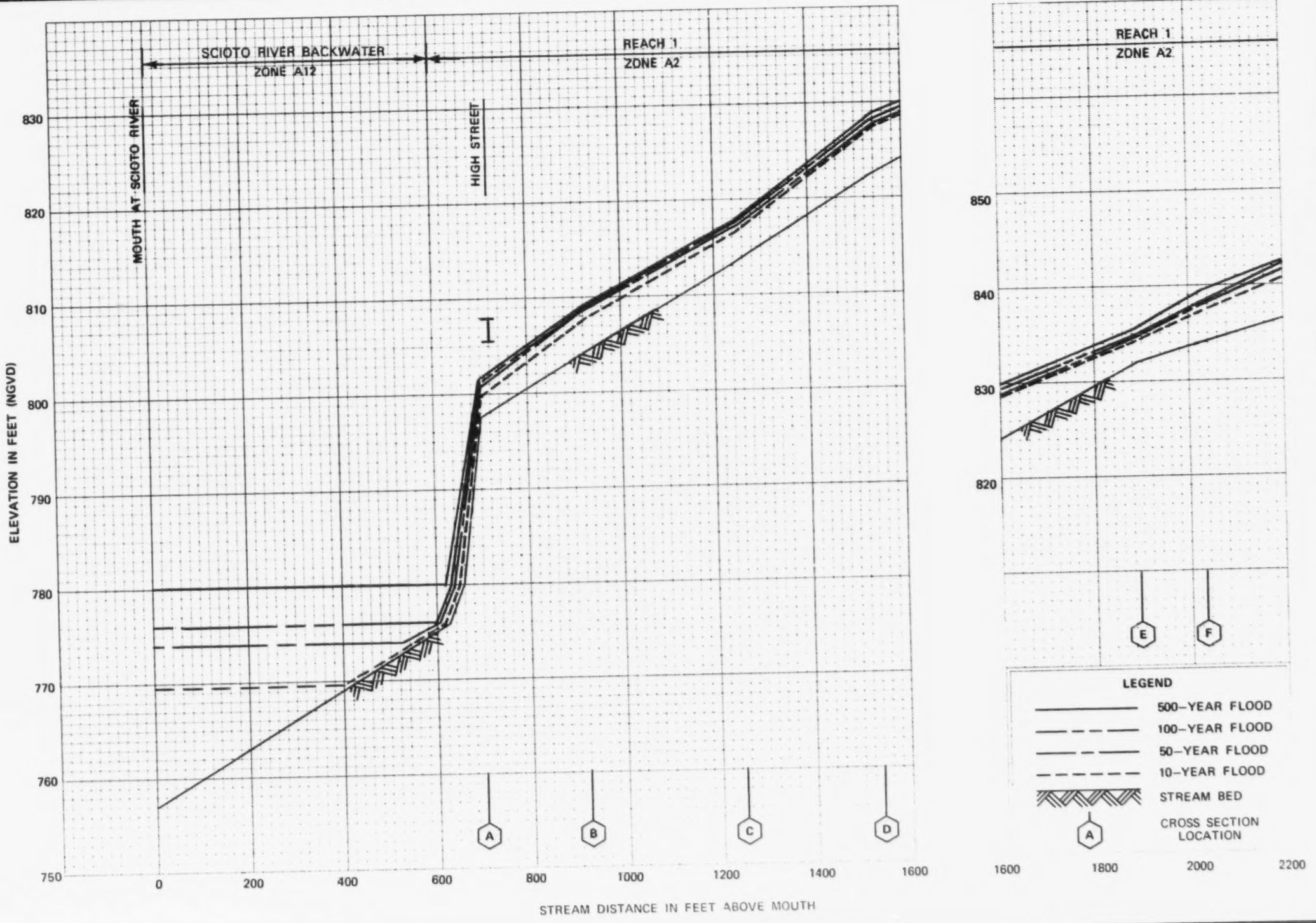
SOUTH FORK INDIAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

14P



FLOOD PROFILES

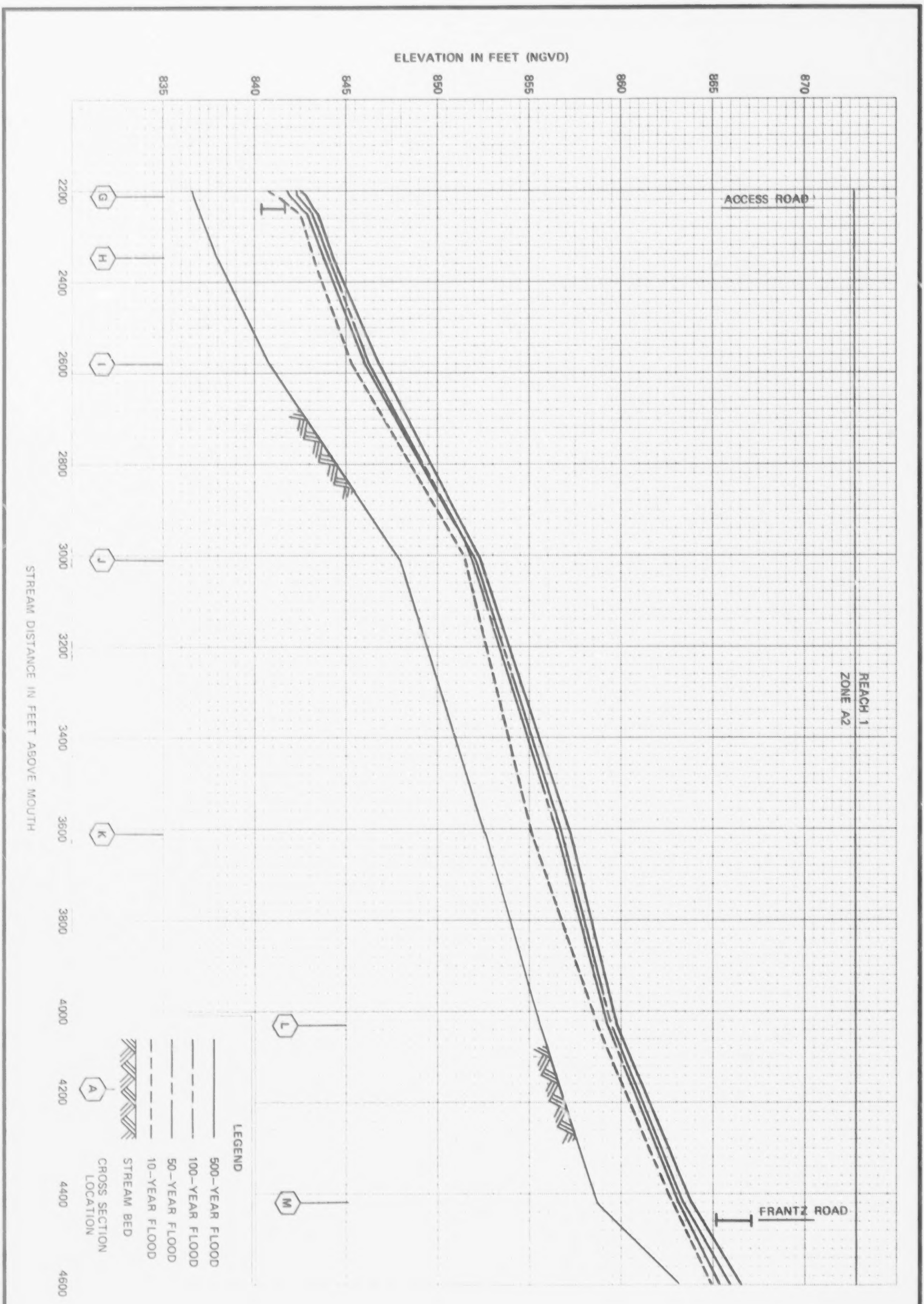
TRIBUTARY S1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

15P

REVISED 9-4-85



FEDERAL EMERGENCY MANAGEMENT AGENCY

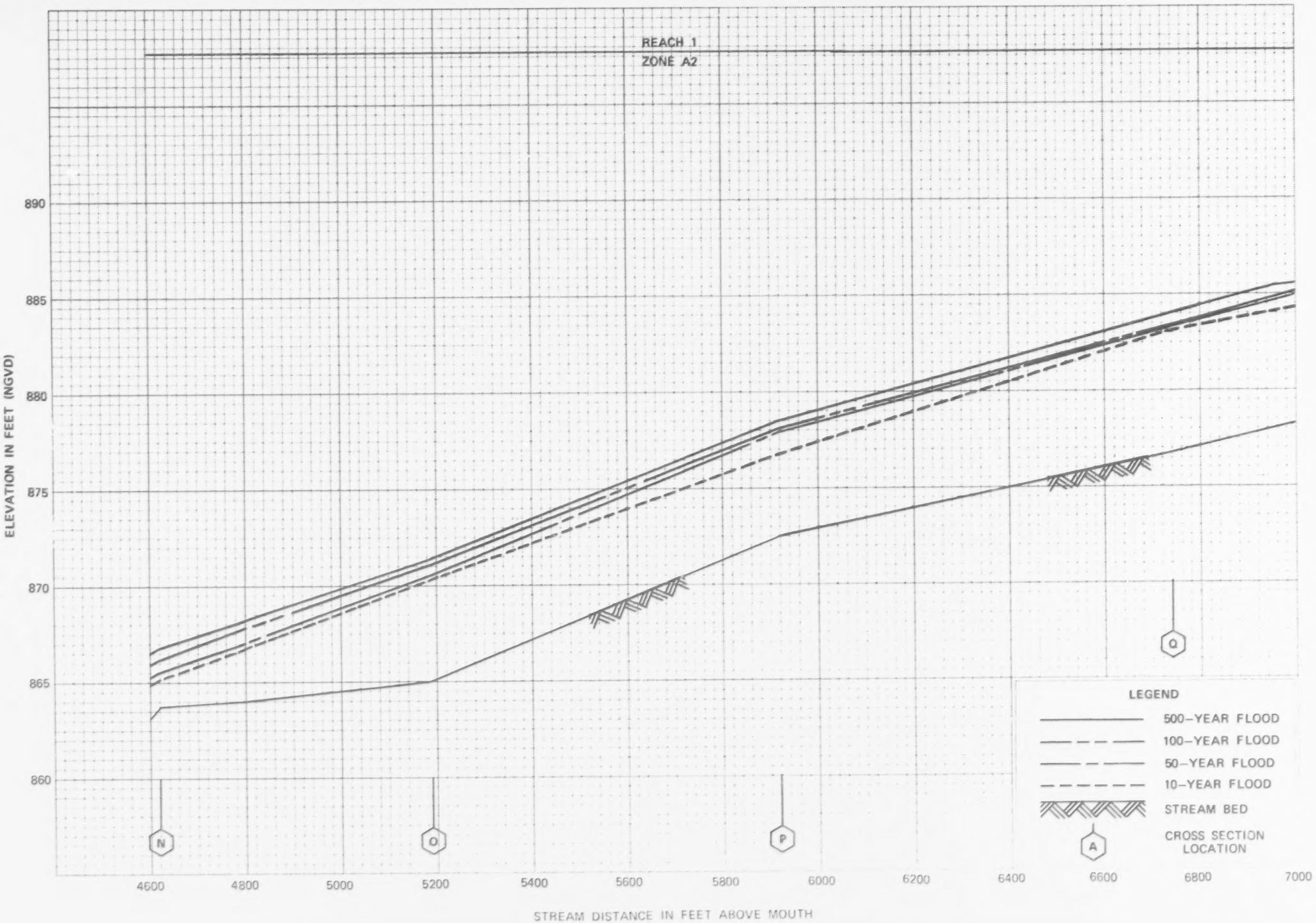
VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

FLOOD PROFILES

TRIBUTARY S1

16P



FLOOD PROFILES

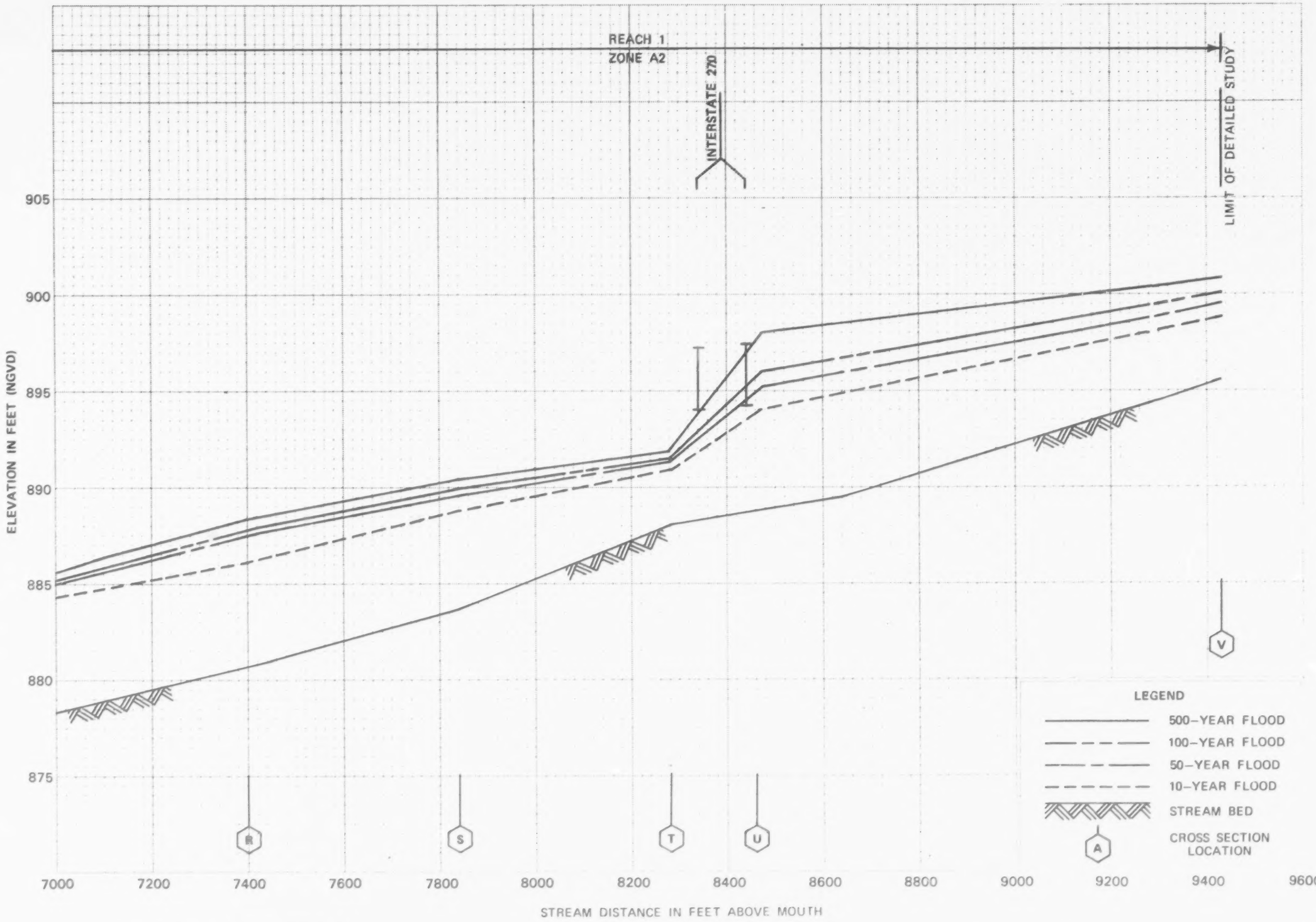
TRIBUTARY S1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

17P



FLOOD PROFILES

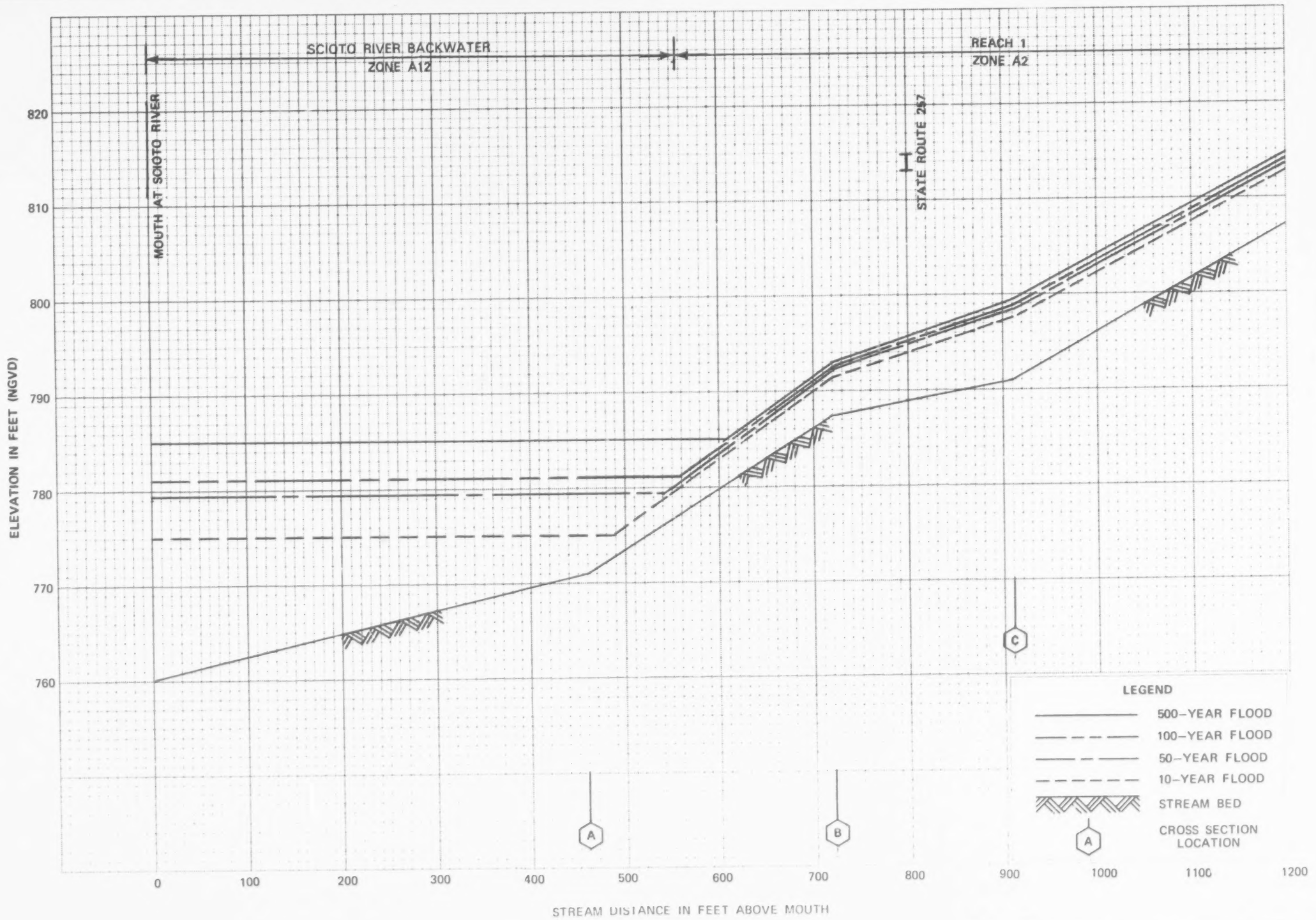
TRIBUTARY S1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

18P



FLOOD PROFILES

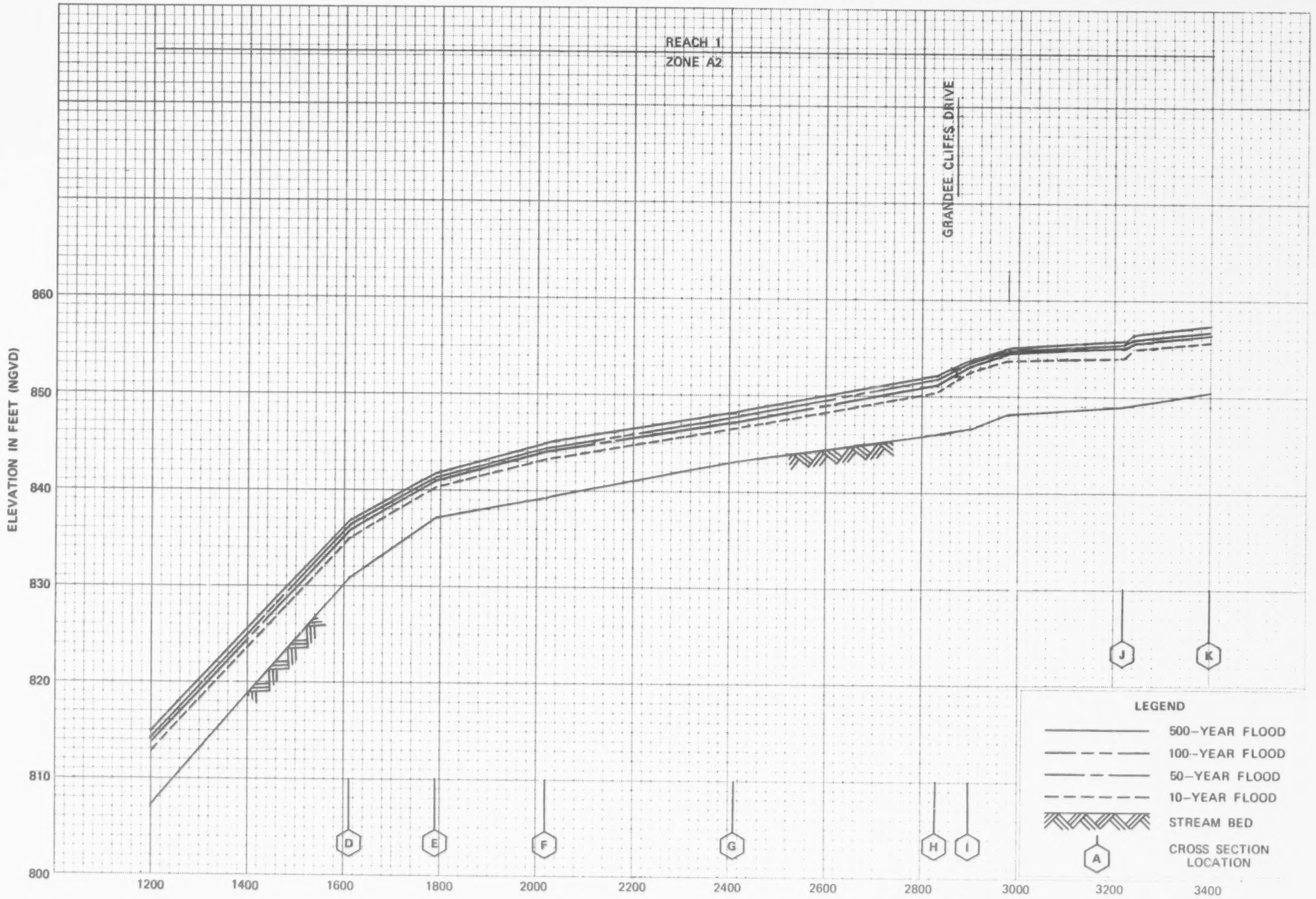
TRIBUTARY S2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH
(FRANKLIN, DELAWARE AND UNION COS.)

19P

REVISED 9 4 85



FLOOD PROFILES

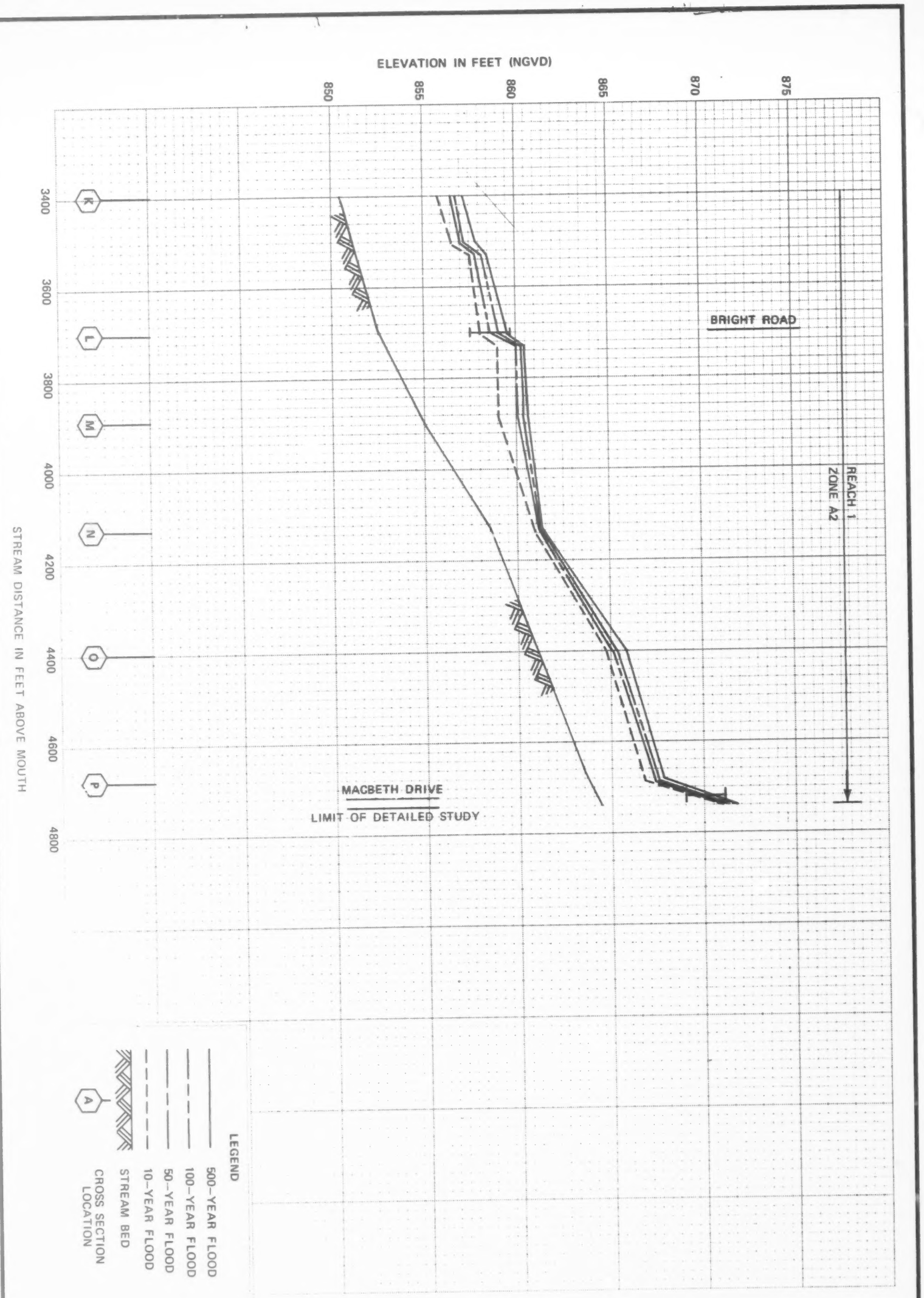
TRIBUTARY S2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF DUBLIN, OH

(FRANKLIN, DELAWARE AND UNION COS.)

20P



21P	FEDERAL EMERGENCY MANAGEMENT AGENCY **VILLAGE OF DUBLIN, OH** (FRANKLIN, DELAWARE AND UNION COS.)	**FLOOD PROFILES** **TRIBUTARY S2**